

MACHINE TOOL

Blue Book

FEBRUARY 1941



THIS IS THE MACHINE
TO USE FOR PRECISION
SECOND OPERATION WORK

HARDINGE BROTHERS, Inc., ELMIRA, N. Y.



No Bottleneck Here with this battery of high speed automatic MARVEL Hack Saws

This battery of high speed MARVEL No. 9A Hack Saws, with automatic bar push-up, has solved the cutting-off problem of R. G. LeTourneau, Inc., Peoria, Ill.

Placed at the open end of the stock racks, they are used to cut-off single lengths or large numbers of identical pieces from $\frac{1}{2}$ " to 6" round bars, $\frac{1}{4}$ " flats in widths to 10", and billets from 2" to 10" square. Built for continuous heavy duty operation, all-ball-bearing and exceedingly fast, they have kept pace with the rapidly expanding production at the immense LeTourneau plant.

After more than 4 years of practically continuous night-and-day operation, Foreman R. C. Langhals, sums it up with: "Very little trouble and good work." And, to that should be added: Faster than any sawing machines or other cutting-off method and extremely accurate—the most economical and efficient cutting-off tools available.

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Ave.,

Chicago, U.S.A.

Eastern Sales Office: 199 Lafayette St., New York



No. 1
Cap. 4 x 4"

No. 48
Light Duty
High Speed
Cap. 8 x 8"

No. 6
Heavy Duty
High Speed
Cap. 8 x 8"


No. 9A
Automatic
Bar Feed
Cap. 8 x 8"

No. 9
Heavy Duty
High Speed
Cap. 10 x 10"

No. 9A
Automatic
Bar Feed
Cap. 10 x 10"

No. 8
Heavy
Cap. 12 x 12"

No. 18
Grand
Cap. 12 x 12"



**HOBART SIMPLIFIED WELDING GUARANTEES NEW SPEEDS -
EASIER OPERATION - CUTS COSTS 15 TO 20% OVER OLD STYLE
WELDERS - THE STANDARD OF THE WELDING INDUSTRY TODAY**

ASK FOR THE VALUABLE FREE BOOKLET*

HOBART BROTHERS COMPANY



**HOBART ARC
WELDING
RODS. Ask
about the com-
plete line — a
rod for every
welding re-
quirement.**

● How to get increased welding production speed is your biggest problem today. Hobart has the solution in its new line of "Multi-Range" Arc Welders that operate easier and faster, with more profit for you. Labor and current costs are substantially reduced; quality of welding is improved. Operators like to use it. Use the coupon for complete details.

LIBERAL TRIAL

on your own
work — at
Hobart's risk!

HOBART BROS. CO., Box TB-21, TROY, O.

"One of the World's Largest Builders of Arc Welders"

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Tell me more about the new time and cost saving Hobart Arc Welders, particularly on the items checked below:

FREE! Valuable booklet telling about the new welding methods that insure better welds in less time.

- ☐ Electric Drive ☐ "Build Your Own"
☐ Gasoline Drive ☐ Easy Terms
☐ Liberal Trial ☐ Welding Rods

I'm interested in _____ amp.

capacity welder, to be used for _____

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RIVETT 918**8 OPERATIONS—1 CHUCKING**

Balanced design and superior operating features of Rivett 918 hand screw machine make it an efficient producer on small precision parts. Lever operated draw-in or push-out collets hold work. Spindle speeds, 150-3750 r.p.m. controlled by single lever. Automatic brake stops spindle.

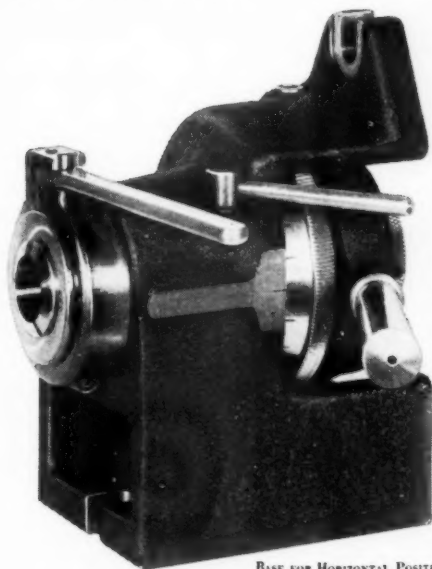
WRITE FOR BULLETIN 918 FOR DETAILS.



**RIVETT LATHE
& GRINDER INC.**

BRIGHTON, BOSTON, MASS. U.S.A.

**NEW or OLD MACHINES
CAN PRODUCE MORE . . .**



BASE FOR VERTICAL POSITION

BASE FOR HORIZONTAL POSITION

WITH THE

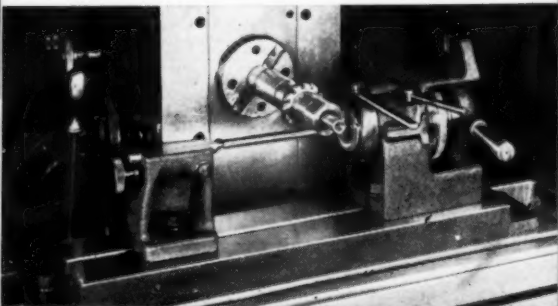
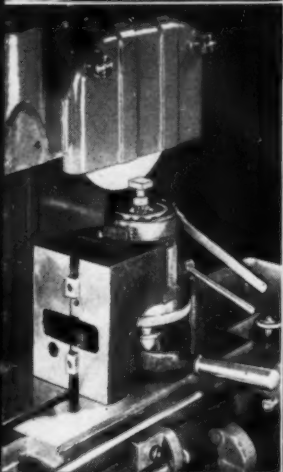
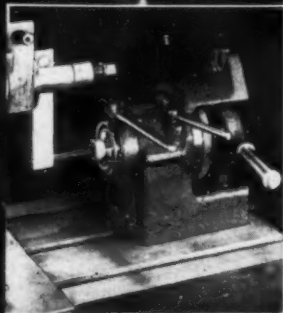
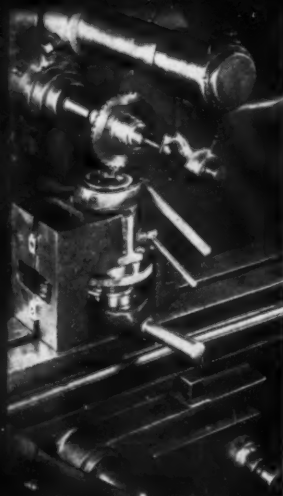
HARDINGE HORIZONTAL-VERTICAL COLLET INDEX FIXTURE

Readily adaptable to any milling, grinding, drilling or shaping machine for producing work required to be held in a collet and indexed 2, 3, 4, 6, 8, 12 or 24 divisions. Takes standard 5C HARDINGE Collets with range from 1/16" to 1" round. Index plate on spindle has a preselecting screw in each of the 24 index holes, permitting the exclusion of all index holes except those needed for the particular application—the operator cannot make a mistake when indexing! A ratchet device is provided for rapidly rotating the spindle when indexing. Lever for quick opening and closing of collet has 100 to 1 leverage.

Specifications: Overall height 8", overall length 6-1/2", bottom of base to center of spindle 4.900". Also supplied with sub-base and tailstock to increase the serviceability.

ASK FOR DESCRIPTIVE BULLETIN

HARDINGE BROTHERS, Inc.
ELMIRA, NEW YORK



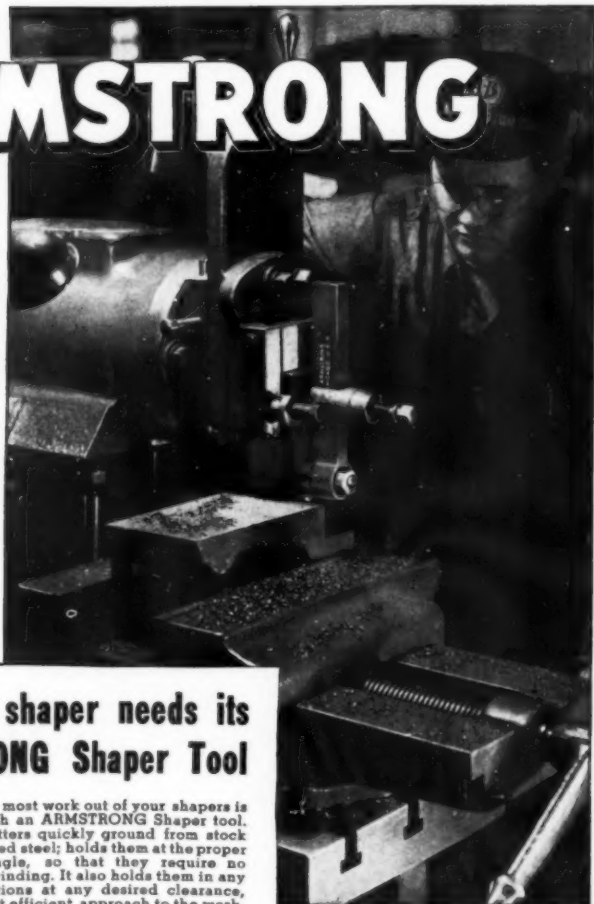
ARMSTRONG



Every shaper needs its ARMSTRONG Shaper Tool

The way to get the most work out of your shapers is to equip each with an ARMSTRONG Shaper tool. This tool takes cutters quickly ground from stock shapes of high speed steel; holds them at the proper (180°) shaper angle, so that they require no weakening back grinding. It also holds them in any one of seven positions at any desired clearance, permitting the most efficient approach to the work, often permitting the finishing of top, sides and even undercutting sides without moving the work from the bed. This tool can also be turned around, throwing the cutter behind the line of center for cutting keyway, fine finishing cuts or wherever a "goose-neck" tool is desirable.

Equip every shaper with its ARMSTRONG Shaper Tools, and you will be ready for work, all work, on a moment's notice; turn setting-up and tooling-up time into production time.



ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

308 N. Francisco Ave. Chicago, U.S.A.

Eastern Warehouse
and Sales:
199 Lafayette St.,
New York



MACHINE TOOL Blue Book

Hitchcock Publishing Co., 508 So. Dearborn St., Chicago

31,000 THIS ISSUE

FEBRUARY 1941

VOLUME 37, No. 2



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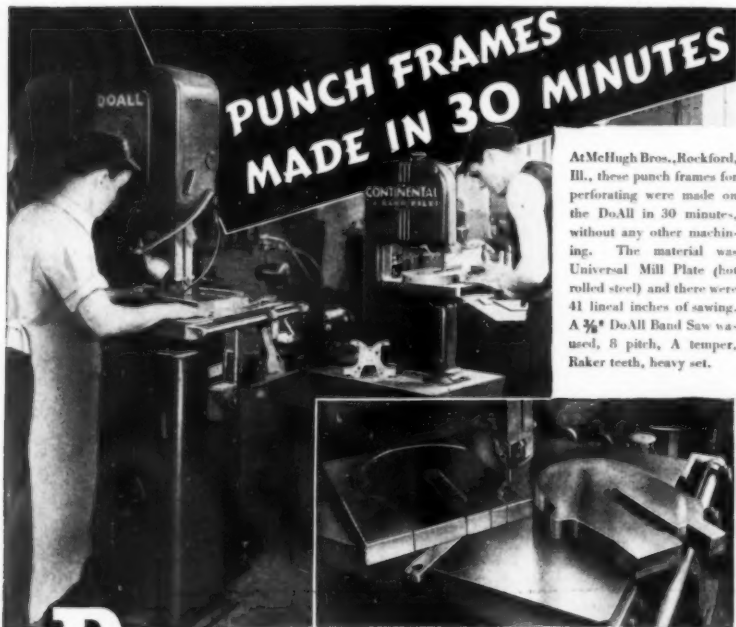
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At McHugh Bros., Rockford, Ill., these punch frames for perforating were made on the DoAll in 30 minutes, without any other machining. The material was Universal Mill Plate (hot rolled steel) and there were 41 lineal inches of sawing. A $\frac{3}{8}$ " DoAll Band Saw was used, 8 pitch, A temper, Raker teeth, heavy set.

DoAll ELIMINATES "BOTTLE NECKS"

DoAll is playing a major role in cutting corners and factory red-tape—does precision band sawing, and is replacing shaping, milling and lathe work with sensational savings of time, labor and material. A day's work in one hour—a two-hours' job in 15 minutes—these are now common experiences among DoAll users in metal working plants, machine shops, automotive and aeroplane plants, arsenals and shipyards, etc.

CONTINENTAL BAND FILER

does continuous band filing, 12 styles of file bands available, $\frac{1}{8}$ ", $\frac{3}{8}$ " and $\frac{1}{4}$ " wide, flat, oval or half round.

Let us send a factory trained man to your plant to show you what a DoAll can save for you.

FREE—Literature or Handbook on Contour Machining, 158 pages of valuable metal working helps.

CONTINENTAL MACHINES, Inc.
1300 S. Washington Ave., Minneapolis, Minn.

DoAll Grinder

A super precision surface grinder—a real production tool. Less vibration because motor is built right on the ball-bearing spindle. Work table has exceptionally large bearing surface. Hydraulic table travel is infinitely variable, up to 50 f. p. m.





PLAN

for
FUTURE
PROFITS
with
JONES &
LAMSON
EQUIPMENT

THE present emergency offers a double opportunity to alert manufacturers. First and foremost, of course, is the chance to rearm America and safeguard our peace. Second, by choosing it wisely, the same equipment that works for defense today can earn greater profits for you in commerce tomorrow. Before committing yourself to building special machines for defense work, consider the versatility of Jones & Lamson Universal Turret Lathes, Comparators, Die Heads, Automatic Thread Grinders and Fay Automatic Lathes. Not only will they increase your future earning power, but they will handle a big share of your present work to best advantage. That's why it pays to put your production problems up to Jones & Lamson engineers.



PROFIT PRODUCING
MACHINE TOOLS

JONES & LAMSON MACHINE CO.
SPRINGFIELD, VERMONT, U. S. A.

MANUFACTURERS OF: SADDLE & RAN TYPE UNIVERSAL TURRET LATHES . . . FAY AUTOMATIC LATHES . . . AUTOMATIC DOUBLE-END MILLING & CENTERING MACHINES . . . AUTOMATIC THREAD GRINDING MACHINES . . . COMPARATORS . . . TANGENT AND RADIAL, STATIONARY AND REVOLVING DIES AND CHASERS

For

DEFENSE Milling Drilling and Boring



You will find the BRIDGEPORT Turret Milling Machine a valuable asset in your Defense production. Advanced modern features assure accuracy, speed and dependability. This machine is flexible and rigid, with unparalleled range and versatility.

Angular settings in one plane are achieved by turning the hand wheel which controls the keyed overarm. Turret diameter is 15" with 5" overarm.

Column, knee and table construction are rugged with wide ways and taper gibs for accurate and vibrationless operation. Table, knee and saddle locks are located in front for easy accessibility.

Graduated dials are 3¼" in diameter. Anti-friction bearings are used throughout.

For additional information and prices on this time and money saver, write to

BRIDGEPORT MACHINES, INC.

52 REMER STREET • • BRIDGEPORT, CONN.

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As a member of NATIONAL BUSINESS PAPERS ASSOCIATION, this publication pledges itself to observe and uphold the following Standards of Practice which have been developed in the interest of business publication readers and advertisers.

1 EDITORIAL POLICY: This publication conceives it its duty to publish editorial material that will extend the knowledge of its readers, expand their business, increase their ability to serve others or make possible their advancement in any direction. No editorial material will be published in consideration of payment either directly or indirectly.

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HITCHCOCK'S
MACHINE TOOL BLUE BOOK
Member NATIONAL BUSINESS PAPERS ASSOCIATION

REPEAT ORDERS

for WELLS SAWS from

Leading Steam Trap Manufacturer

Gentlemen:

On Nov. 16, 1928, we purchased our first Wells Manufacturing metal band saw and since that date, we have purchased three additional Wells saws. We are so well pleased with these saws that all our metal sawing needs are now taken care of with Wells Metal Band Saws.

Yours very truly,

ARSMSTRONG MACHINE WORKS
L. G. Patterson
Shop Superintendent

REPEAT orders tell a story of customer satisfaction—proof of a product's superiority. Wells Saws DO give customer satisfaction wherever they're used. They're rugged, dependable, fast, accurate, portable. They cut costs and take the kinks out of knotty production problems. Take advantage of their abilities.



NOW BUILT IN 3 SIZES:

No. 5—5" diameter round or 5"x10" flat.

No. 8—8" diameter round or 8"x16" flat.

No. 12—12" diameter round or 12"x16" flat.

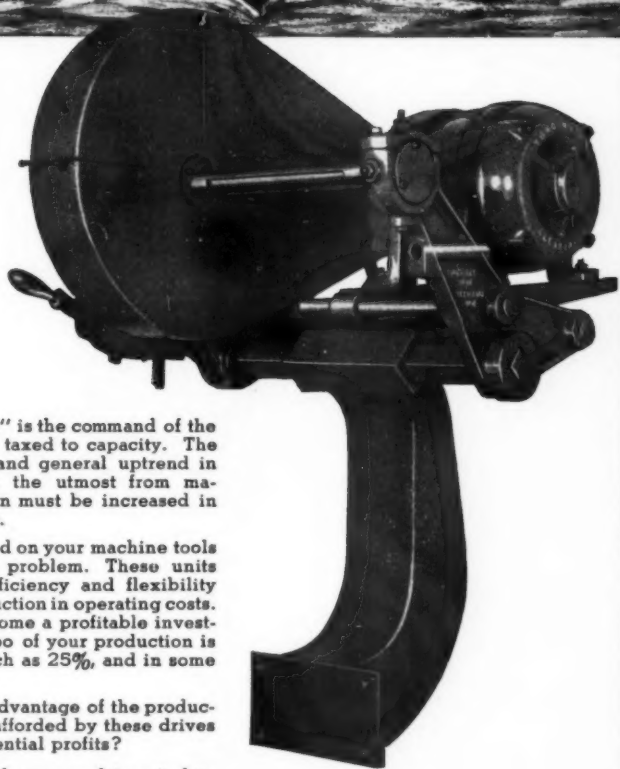
Also the No. 9 Upright Saw

WELLS MANUFACTURING CORP.,

Three Rivers, Mich.

WELLS *METAL CUTTING BAND* **SAWS**

Full Speed Ahead *with* **TORQ DRIVES**



"Full Speed Ahead" is the command of the nation. Plants are taxed to capacity. The Defense Program and general uptrend in business, demand the utmost from machinery. Production must be increased in every possible way.

Torq Drives installed on your machine tools help to solve this problem. These units offer increased efficiency and flexibility with a marked reduction in operating costs. Your machines become a profitable investment and the tempo of your production is stepped up as much as 25%, and in some cases more.

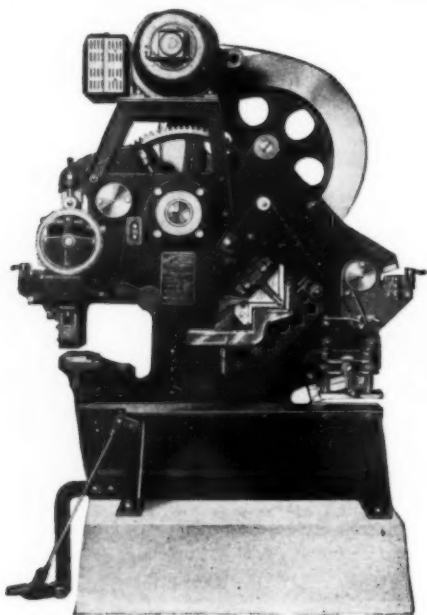
Why not take full advantage of the production opportunities afforded by these drives and cash in on potential profits?

Write for full details on our drives today.

THE TORQ ELECTRIC MFG. COMPANY

put your
METAL WORKING JOBS
on a REAL production basis

for
**PUNCHING
SHEARING
SLITTING
COPING
NOTCHING**



of
**ANGLES
TEES
ROUNDS
SQUARES
FLAT STEEL**

The versatility of the Buffalo UNIVERSAL Iron Worker makes it an outstanding cost-cutting tool in any shop where metal is worked. Hand methods can't compare with this rugged giant in speed, accuracy, economy. Here's an investment that's bound to pay you dividends for years to come! Write today for full details—ask for Bulletin 360.

BUFFALO FORGE COMPANY

161 Mortimer St.

Buffalo, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

"Buffalo"

UNIVERSAL IRON WORKER



*Easy
Casting Cleaning
with a B-3-X
POWERPLUS
Grinder*

ROTOR TOOL
COMPANY

CLEVELAND, OHIO

TAP 2,400 TO 12,000 HOLES PER HOUR with this up-to-the-minute



Built into this machine is the experience of 25 years specialization in the development and manufacture of tapping devices to meet the ever-changing demands of industry. It embodies every feature needed for fast, accurate tapping production with maximum tap protection and minimum effort by the operator.

Equipped with the standard 2-spindle head as illustrated, an average production of 2400 holes per hour is easily maintained. Interchangeable heads with spindles up to 12 will tap as high as 12,000 holes per hour. These heads are made to order from stock parts to fit specific requirements.

BULLETINS No. 4 and No. 3 give full details about the Machine and the Multiple Heads. Write for copies today.

IMPORTANT—For top tapping production with accurate results you must use the right taps and the work holding set-up must be right. It's our business to know the right taps and how to handle parts for tapping. Our recommendations, including work holder designs, are yours without obligation. *Write us.*

ETTCO TOOL CO.

596 Johnson Ave. - Brooklyn, N. Y.
DETROIT - CHICAGO

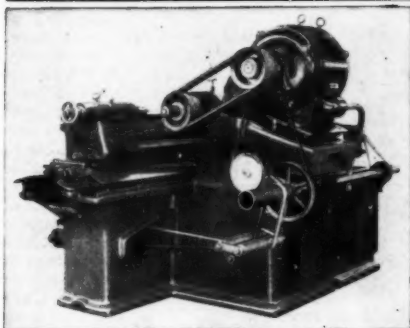


The
Famous

Ettco-Emrick

DRILL CHUCKS • TAP HOLDING CHUCKS
TAPPING ATTACHMENTS • TAPPING MACHINES
MULTIPLE SPINDLE TAPPING AND DRILLING HEADS
Unexcelled for Design, Materials and Workmanship

Motorized Units for DEFENSE



Modern armies must be motorized to be effective. Most modern machine shops get best results by motorizing their equipment. BERKELEY motor drives are now available for all types and makes of grinding machines. They transform your belt driven grinders into modern, high production units at a fraction of the cost of replacement equipment.

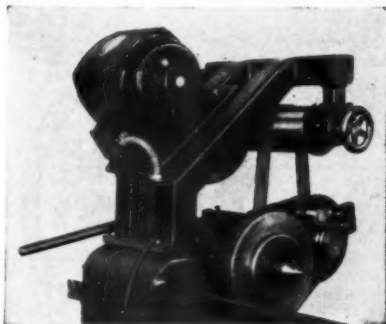
BERKELEY DRIVES Are Available For All Machine Tools

Above is shown a BERKELEY drive applied to a Norton cylindrical grinding machine. Motor is mounted on a welded steel base. Our method of delivering power to work table permits free movement of wheel slide.

At right is shown BERKELEY head-stock drive on the same Norton grinder. Changes of work speed can be made quickly.

Have you consulted BERKELEY on your motorizing needs? Our long experience and complete line of drives with models for every requirement, enable us to give you sound engineering recommendations.

Write today giving full description of the machinery you have in mind.



The Berkeley Equipment Company
CORRY **PENNSYLVANIA**

NEW TAPPING HEAD SAVES MONEY FOR YOU

QUICKLY PAYS FOR ITSELF IN FASTER PRODUCTION AND LESS TAP BREAKAGE



A prominent Ohio manufacturer writes: "On checking with our factory, I find the *Procunier High Speed Tapping Head with the Tru-Grip Tap Holder* is very satisfactory. It not only eliminates the necessity for using extension taps, which are more or less expensive, but it reduces tap breakage . . . and enables our workmen to produce more and better work . . . we are now able to discard our taps due to wear, rather than breakage." Some of the reasons back of this letter and hundreds of similar letters from enthusiastic users are: *Tru-Grip* tap holders weigh less than $\frac{1}{3}$ the weight of conventional tap holders, and are more compact and accurate. Only *Procunier High Speed Tapping Heads* offer all these features: Dry, double-cone friction clutch that won't wear and can't absorb oil; makes bottom tapping easy; ball bearings; three point balanced, heat-treated gear reversing mechanism, which distributes pull and and greatly reduces strain — and other important features.

SEND FOR BULLETIN

giving full details, description and prices on complete line of *Procunier Precision Tapping Heads* to meet all needs, the new *Tru-Grip Tap Holder*—and also the full line of *Procunier Universal Tapping Machines*, hand, foot or air operated.

Procunier Safety Chuck Co.
14 So. Clinton St., Chicago, Illinois

Send me Bulletins on: ☐ High Speed Tapping Heads ☐ *Tru-Grip* Tap Holders ☐ Universal Tapping Machines.

Name

Address

City..... State.....

PROCUNIER
SAFETY CHUCK CO. 14 S. Clinton St.
Chicago, Illinois

New Carbide Tool GRINDER



Specifications of Delta Carbide Tool Grinder

This new Delta grinder has $13\frac{1}{2} \times 8$ Tables with $\frac{1}{2} \times \frac{7}{8}$ grooves for fixtures. Table tilt 30° toward wheels and 45° away from wheel. Supplied with 1 No. 60 Grit and 1 No. 120 Grit Silicon Carbide Wheel. (Standard Diamond Wheels can also be used.) Speed: 3450 R.P.M. with surface speed of 5200 R.P.M. Furnished with 1 water pot and adjustable light fixture. Sub-base is removable for easy cleaning. Reversing switch built into base. Available with wide range of motors to fit all needs—in choice of bench or pedestal models.

A New Low-Cost Delta Unit Designed Especially for Grinding Tungsten Carbide Tools --- Which for Convenience, Accuracy and Sturdiness Cannot Be Duplicated

Another Delta achievement—designed to insure accuracy and long life—manufactured by modern precision methods—so low in cost that it can be used in any shop, large or small. Equipped with one No. 60 Silicon-carbide wheel and one No. 120 grit Silicon-carbide wheel, the first for preliminary grinding—the second for producing a perfect cutting edge. So accurate is the machining on this grinder that it runs absolutely true, free from vibrations so that accurate, delicate grinding can be done. Point for point—including its surprisingly low price, massive design and construction—you will find this the best carbide tool grinder of this kind available today.

Here are some of the Special Features

Reversible motor with self-sealed ball bearings -- lubricated for life . . . removable sub-base so that sludge can be easily and quickly cleaned out . . . adjustable swinging light with definite stop so that wires cannot become twisted in conduit . . . reversing switch conveniently placed in front of grinder . . . available in both bench and pedestal models.

Send for Full Information

Fill out coupon below for full details, specifications and prices on this new Carbide Tool Grinder.

DELTA MFG. CO.
(INDUSTRIAL DIVISION)
624 E. Vienna Ave.
MILWAUKEE, WISCONSIN

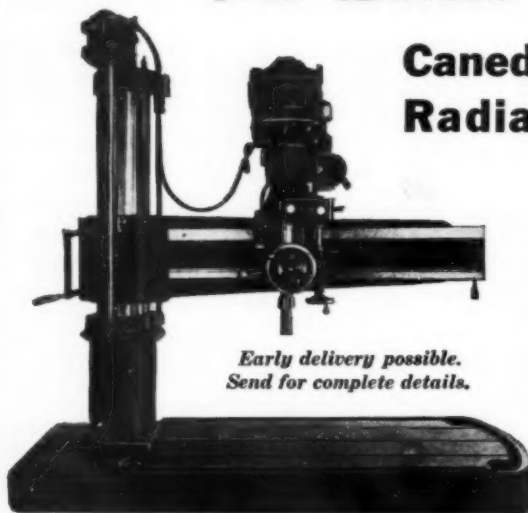
Delta Mfg. Co., (Industrial Division)
624 E. Vienna Ave., Milwaukee, Wis.

Gentlemen: Please rush to me full details and prices on the new Delta Carbide Tool Grinders. Also send copy of latest Delta Catalog of Industrial Production Tools.

Name
Address
City State

The Latest

Canedy-Otto Radial Drill



*Early delivery possible.
Send for complete details.*

We invite you to send for complete information regarding these and our many other models of drills and radial drills. For years, Canedy - Otto has been the manufacturer of first-class, high grade drilling units. Single spindle, multiple spindle, and radial drills. We can help you solve your production problems. Do not delay. Write today.

SPECIFICATIONS:

Drills to the center of circle on base or table

Length of arm

Greatest distance from spindle to base

Minimum distance from spindle to base

Minimum distance from spindle to column

Traverse of spindle

Hole in spindles—More Taper

Diameter of spindle at nose

Traverse of head on arm

Traverse of arm on column

Spindle speeds with 1200 RPM motor

Spindle speeds with 1800 RPM motor

Feeds per revolution of spindle

Bearing of arm on column

Size of main driving motor

Height of drill column over gears

Working Surface of Base

Net weight

9" Column
3' Arm

73 1/2"

3"

43 1/2"

9 1/2"

10 1/2"

9 1/2"

No. 4

2 1/2"

25 1/2"

21"

(60, 85, 120, 180,

(425, 560, 860,

(1200 RPM

(85, 130, 180, 274,

(560, 860, 1160,

(1750 RPM

(.004" .007"

(.010" .020"

14"

2 HP.

85"

29"x45"

4000 lbs.

11" Column
4' Arm

96"

4"

48"

15"

10"

9 1/2"

No. 4

2 1/2"

36 1/2"

24"

(60, 85, 120, 180,

(425, 560, 860,

(1200 RPM

(85, 130, 180, 274,

(560, 860, 1160,

(1750 RPM

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(.010" .020"

14"

2 HP.

85"

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4000 lbs.

11" Column
5' Arm

120"

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48"

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9 1/2"

No. 4

2 1/2"

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22"

(60, 85, 120, 180,

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(1200 RPM

(85, 130, 180, 274,

(560, 860, 1160,

(1750 RPM

(.004" .007"

(.010" .020"

14"

2 HP.

85"

29"x45"

4000 lbs.

CANEDY-OTTO MFG. CO.

CHICAGO HEIGHTS, ILLINOIS

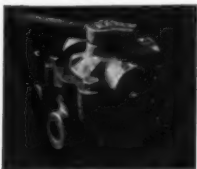


Let **AIR** Do The
Heavy
Work, Too

... with
Heavy Duty
Air Cylinders
by **NOPAK**



Mirror finish bore, straight, round and concentric, plus perfect piston fit, assures efficient use of air power.



For perfect control of air-powered equipment, specify NOPAK leak-proof, wearproof, flat-disc operating valves.

Use them to replace antiquated methods, to release manpower for more productive work, to save time, cut handling costs, speed-up production lines. NOPAK Heavy Duty Cylinders enable you to make full use of low-cost air-power for the heavier tasks of pushing, pulling, lifting or lowering. They are fast, smooth and positive in action, economical to operate.

NOPAK Heavy Duty Air Cylinders are extremely rugged in construction. Cylinder flanges are welded to body, eliminating tie-rods. Cast steel heads are bolted directly to flanges. Extra large piston rods can be furnished in alloy steels where extra strength is needed.

The NOPAK Heavy Duty series is made in a full range of standard sizes up to 12" bore for air pressures up to 250 lbs. Our engineers will gladly submit recommendations based on your specifications. Write today!

GALLAND-HENNING MFG. CO.
2760 S. 31st St. Milwaukee, Wis.

NOPAK

VALVES and CYLINDERS

DESIGNED for AIR or HYDRAULIC SERVICE

ANDERSON POWER SCRAPERS

do work of
8 MEN



NOT only do these power scrapers work faster than is possible with hand scraping, but they also produce a better job with less effort on the part of the operator. Guidance and control of the scraper is as natural as using a hand scraper (the bite of the block is regulated by the angle of the scraper) . . . and fatigue is practically eliminated as the $\frac{1}{4}$ H. P. electric motor does the heavy work.

This versatile, convenient scraper has a steady scraping stroke from a fraction of an inch to $4\frac{1}{2}$ feet . . . a ram which is quickly raised or lowered to suit . . . an automatic circuit breaker in case of overload . . . a self-contained grinding wheel for sharpening scraper blades . . . and a self contained motor which operates from any convenient lighting point. Write now for additional information.

Anderson

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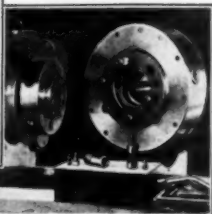
for chuck users. Published by
the Cushman Chuck Company in
the interest of better service during
the National Defense emergency.

HOW TO AVOID DELAYED DELIVERIES ON CHUCKS FOR THE NEW TYPE SPINDLES

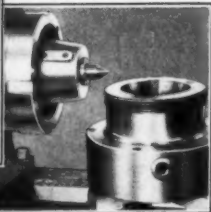
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Cushman is better equipped and is turning out more chucks today than at any previous time in its history. We have been able to give the great majority of our customers normal fast service despite abnormal conditions.

But it is manifestly impossible and, in fact, not desirable at this time to maintain the tremendous standing stocks that would be necessary to supply all needed chuck types in each of the three new type spindle noses illustrated on this page.

We therefore suggest that you place your order for chucks for the Type A-1, Type D-1 and type E Spindles at the time you place your order for the lathes. In this way we can give you every reasonable assurance that the chucking equipment will be ready for delivery at

the time you receive the machines. This may seem like an unimportant detail, but it is attention to just such details that will save precious time in national defense work.

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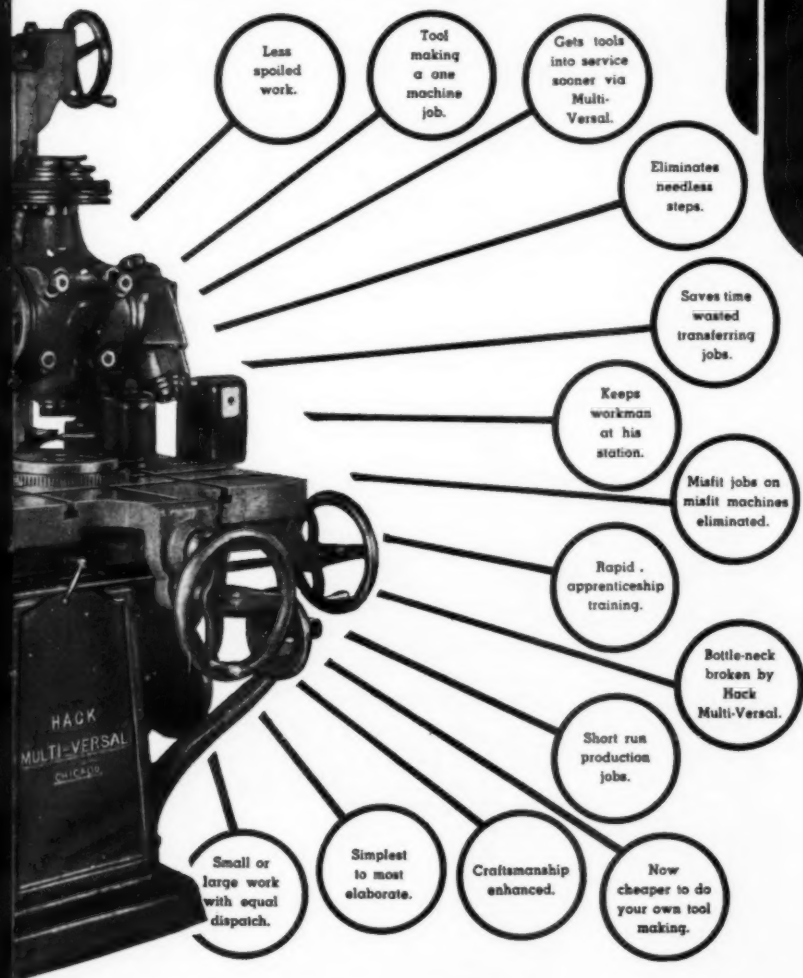
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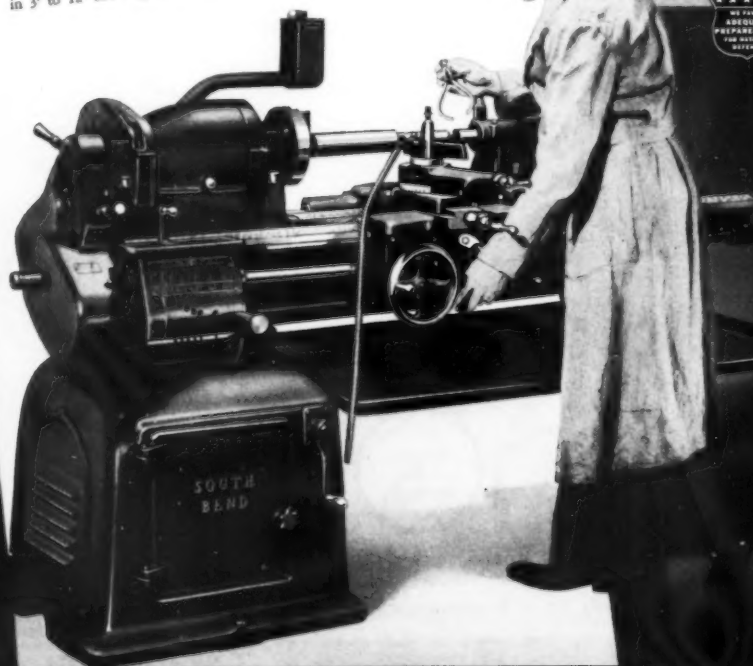
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The Editor's Page

DURING the last few months, strikes and labor disputes have delayed work in several important industrial fields — some of them related to defense projects.

But have you noticed the gratifying absence of labor trouble in that essential defense industry—the machine tool field?

Production quotas of necessary tools were doubled without fuss or confusion. Then without ballyhoo, the tool output was increased again. Now the resourceful tool manufacturers are making further increases, pushing on to new and unprecedented levels.

Such patriotic cooperation sets a worthy example for all American defense industries. It proves beyond question, the loyalty and industry of workers in the machine tool plants — intelligence and fair dealing on the part of management.

It is a relief not to hear the term “bottleneck” applied so loosely to the tool industry. Seldom has an epithet been less deserved. Ordinarily, the neck of a bottle is mentioned disparagingly only when an attempt is made to force excessive flow. The resourceful tool builders have shown that a mythical bottleneck may be stretched.

A new defense development is Mr. Knudsen's appeal for a nationwide census of manufacturing facilities. The inventory will reveal: — (1) How many machine tools are being used part time, or not at all. (2) The extent of our facilities for receiving and shipping at manufacturing centers. (3) The number of skilled, semiskilled and unskilled workers—how many shifts they work—and how many workers are being developed through company-sponsored training programs.

Wesley G. Paulson

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Featured In This Issue

SCREW THREADING EFFICIENCY

Few operations, if any, enter into the making of so many products as do the cutting of screw threads. H. J. Chamberland, who is a frequent contributor, covers the "ins and outs" of thread cutting, placing particular emphasis on the steps necessary for servicing and maintaining equipment.

CLAMP SHOES AND PLUGS—H. F. Williams is no stranger to BLUE BOOK readers—and in his current article, he presents a broad assortment of clamping devices. Many of these designs will be found useful for reference purposes, particularly in designing and experimental departments.

PUNCH PRESS SAFETY — Power Presses and their tools can be considered a most hazardous group of industrial operations—a most fertile field for accident-prevention work. Wendell M. Nelson is Assistant to the Manager of the Schenectady Works, General Electric Co., and it is hoped that his recommendations will be helpful and constructive in preventing punch press accidents.

BROACHING COUNTERWEIGHTS

The manufacturers of a well known radial type of aircraft engine are now broaching the slots in crankshaft counterbalance weights. The machine used is a standard model — and details of the operations and fixtures are given.

DRUM FABRICATION—Here's another useful application of versatile arc welding, described by Fred O. Volz, Vice President, Lakeside Bridge & Steel Co., Milwaukee, Wis. Data and illustrations are from an award study submitted to the James F. Lincoln Arc Welding Foundation.

COOLANTS FOR CARBIDE TOOLS

Coolant requirements of carbide tools are quite different from ordinary machining practice. This is the third installment in a series by James R. Longwell, Chief Engineer, Carboloy Co., Inc., and he gives detailed information on the important subject of coolants and their application.

BROACHING FIXTURES—Some 60 different parts are now being broached in job-lot quantities for motor truck trailers. A single Colonial unit is used with seven interchangeable fixtures. Changing the pads or position of the clamps on each fixture, permits use for several different sizes of each part. The different fixtures are shown, and the parts are indicated in the small inserts.

COLD FORGING COPPER—Heretofore, cold forging of copper has been difficult because of a tendency for the copper to seize in the die. This new method enables a well-known electrical equipment manufacturer to cold forge complicated copper contact fingers—with a stated production rate of 350 per hour.

NEW TRENDS AND DEVELOPMENTS—One of the largest boring mills in the world, recently went to work, contributing its part to the defense program. New equipment for speeding the lapping of aircraft engine gears is described. Safer, lighter industrial goggles are introduced—also new recessing, boring and tapping equipment. New hydraulic presses, new welding and lighting equipment, a new cutoff tool and a new motor are presented.

SHOP NOTES—The importance of proper lubrication in threading operations is covered in Mr. Schaphorst's contribution. Arthur Havens, whose vocation is welding, and avocation writing about it, tells of an effective method of holding an air motor in reaming operations. Charles H. Willey writes about a handy screw or rivet cutter. John Zeman's clever tool for cutting off tubing is described. Theodore Oshinsky tells about an ingenious tool for eliminating breakage in riveting switch parts to porcelain. A new Reliance all electric, adjustable speed drive is described—along with many other helpful items.

"Cracker Barrel Steel" is Gone!



BACK IN THE "GOOD OLD DAYS" crackers came in barrels; and many people bought steel, too, with no clear idea of what it was, or how it was made. Methods of storing and handling were "hit and miss"; results to be expected were uncertain! Crackers were crackers; steel was steel!

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STEELS

Screw Threading Efficiency

By H. J. CHAMBERLAND

SCREW threads are no exception to the constantly increasing demand for closer precision, continuous uniformity and a maximum number of pieces per grind where metal-cutting dominates the situation. Few operations, if any, enter into so many products as do the cutting of screw threads and production costs are by no means a secondary consideration.

The most effective, economical and precise screw cutting procedure, in non-hardened steels, alloys and an extended variety of industrially used materials, is obviously by means of self-opening

adjustable die heads and collapsing adjustable taps. However, the heads proper, are but so-called mechanical bodies. In spite of their accurate and sturdy construction for rigidity and stamina, the heart of these units actually consists of four or more components known as chasers. This equipment is usually delivered with a predetermined guarantee of production, in turn supported by instructive material for upkeep. Unless this has the support of deserving machine tools and if chaser servicing recommendations are not carried out, what should prove a



Fig. 1—Although it takes two men to do it, this is indeed "threading by the yard." In fact it is really a 6-yard job and a full length 1-3/4"-5 Acme thread. This shows to what extent die heads can be used economically.

Fig. 2—An interesting and productive screw thread cutting set-up on turret lathe, using two die heads for cutting $\frac{5}{16}$ "-11 and $\frac{13}{16}$ "-10 U. S. threads, respectively. The parts are vacuum cup studs and while four other operations are involved, the total machining time per part is given as 2.8 minutes.



bonanza-investment may develop into a costly industrial headache.

Since so many industrial plants are facing the problem of attempting to produce with what we might term "overnight-trained operators," due to our huge preparedness program, I feel that a discussion of chaser maintenance for maximum efficiency is of timely importance. While manufacturers of these tools take every precaution to protect their individual back-yards, they are nevertheless held responsible too often for occurrences beyond their control. Coming from one who has seen chasers repeatedly abused, and chasers handled with kid gloves, some previously disregarded suggestions can stand another shine and the "tips" may not this time bounce back.

Designing for Threading

Before we consider the productive capabilities of chasers ground for individual requirements, it is advisable primarily to outline the importance of designing threaded parts correctly, so as to reach a minimum production cost through coordination with the efficiency of the chasers.

First, the machinability of material is of utmost importance and preference should be given stock that will cut most freely without sacrificing intended physical properties. We have an ample

variety of analyses in carbon, leaded, stainless, manganese steels; aluminum alloys, brasses and bronzes which simplify the selection of materials having the desired strength.

Second, the thread specifications should, if at all possible, be of standard form and size.

Third, tolerances should not be closer than the case actually requires, meaning, there's no sense in calling for a Class 3 or Class 4 fit when a Class 2 fit would answer the purpose just as well.

Relative to these two latter suggestions, one should realize that a special thread, and tolerances not within the range of commercial practice will probably double the cost of chasers. To this must be added a substantial increase in cost for gages, over that of standardized tools. This combination, therefore, makes any special thread an expensive move.

When a special thread is absolutely necessary, attention should be diverted to the helix angle because the steeper the angle, the more power required to thread and results often are disappointing. Another factor to remember is that with a coarse pitch in relation to small diameter of part, in many cases the core is so weakened that it will not support the strain of

cut. In instances where a single standard thread cannot be used, if more rapid advance is desired in one turn, multiple threads should be brought into use. In the fourth place, ample consideration should be given to a design that will avoid threading close to a shoulder. This recommendation is particularly important and will be given due attention later.

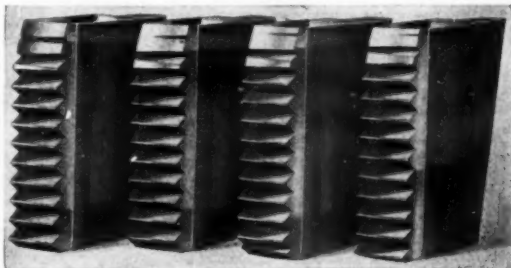
Know Your Heads and Chasers

To a large number of operators whose duties are to produce screw threads

ment so he can study its construction in detail, then note the gradual and rapid improvements from a production and depreciation point of view.

Speaking of self-opening adjustable die heads and collapsing taps, respectively, available heads usually have a threading range from 1" to 8" for internal work and 1/16" to 10" for external threads. These heads are, of course, the most productive and efficient since they eliminate the risk of damaging the threads on the return

Fig. 3—This set of chasers certainly is nice to look at — but how long they will remain so is another story. The only thing these or other chasers can afford to lose, is weight and it must disappear gradually and normally to prove generally constructive rather than destructive.



with chasers, chasers are just that, and so are the threading heads. As a matter of fact, some foremen and set-up men are not too well informed on this subject but are not always to blame. Informative circulars and charts are easily available and should be distributed freely all the way down the screw thread cutting line. Generally speaking, it is not sufficient for the operator of any machine tool simply to understand how to start and stop his machine and to set and reset the cutting accessories. Let him take home all printed material relative to the complete equip-

ment of the tools, a feature impossible with any other threading procedure. However, a substantially large number of plain adjustable heads are available and should be given the preference over solid threading tools as the former cost very little more and can be set quickly to serve various degrees of thread precision.

Heads are also designed for rotary and stationary work and for taking roughing and finishing cuts successively on each part. Some heads are so small as to operate efficiently at 5000 r.p.m. Four chasers are generally used for

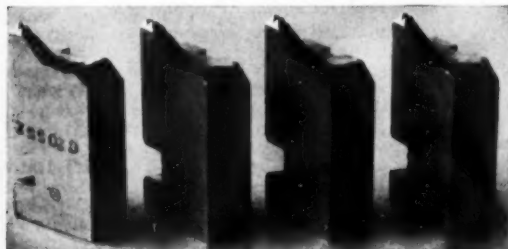


Fig. 4—With but one full thread left, these chasers produced several thousands of 1 1/4"-14 threads after previously cutting hundreds of thousands. If all users of chasers repeated this feat, chaser manufacturers would need supporting side lines. However, this one lesson represents a full course in chaser upkeep.

threading up to 2-1/2" in diameter and six chasers for larger diameters. Especially made heads handle taper threading problems. For extra long and identical production, or in cases where chaser breakage cannot be controlled entirely, circular or tangent chasers are most economically used. Despite the fact that these require a longer resetting time than regular chasers, their design permits a substantially larger number of grinds. Heads that are kept in perfect shape, by regular cleaning to remove gummed oil and chips, will pay for themselves over and over again and never let up on their efficiency. Stockable chasers are made of the highest quality high-speed steels, scientifically heat treated, ground all over and with thread forms lapped for maximum results in threads produced.



Fig. 6 — Ingenious ideas for loading and unloading can often increase the productivity of die and tap heads. In this case a sliding work-holding fixture is foot-operated. The operator unloads and loads at one end while tapping at the other.

Skate Sharpening Practice Is Detrimental

Incredible as it seems, free-hand grinding of chasers still goes on in many small shops and it is but a waste

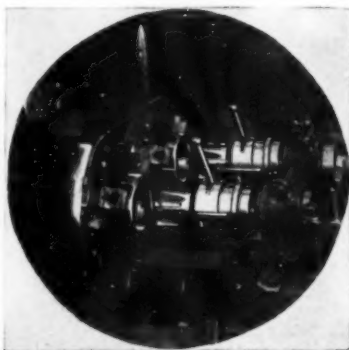


Fig. 5—The larger the thread diameter, the more effective are the collapsible taps. Illustrated is a 3-3/4"-12 thread job. Material—S. A. E. 1020 steel forgings, well cleaned. With pitch diameter limits of .002", the actual threading time per piece is .0078 hrs.

of time to try and interest this particular group. Another more attentive group of chaser users rely on individual technique and try to get results by means of more or less practical make-shift accessories. Personally, I have frequently been confronted with this problem, but have always managed to make the big boss understand that nothing short of purposely designed fixtures could do a set of chasers full justice. Such fixtures are most reasonably priced, in comparison with what they accomplish in increasing production, maintaining uniformity of prescribed tolerances and leading the chasers through a normal and efficient life.

Chaser grinding fixtures require no special grinding machine in connection



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therewith, unless a vast supply warrants such an investment. Any tool room surface grinder or universal tool grinder will answer the purpose. The situation may appear less complicated

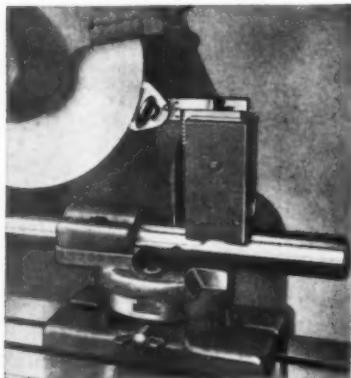


Fig. 7—Nothing short of a dependable chaser grinding fixture will maintain screw thread production at its maximum efficiency. Note range of adjustments of fixture shown, including chamfer angle setting gage which eliminates guess-work.

if the fixture used is one designed by the manufacturer of the chasers involved. However, the fixture shown in Figures 7, 8, 9, and 10, respectively, is universally intended and although a geometric, it will handle other kinds of chasers as well. Blank chaser holders, to be altered to fit individual requirements, are available from the manufacturers. The various makers of the tools in question have worked out their individual chaser grinding recommendations in the form of charts and booklets. These constitute an essential part of the service, so it seems advisable to skip that part of it and consider ways and means which will cause each and every grind to be effective.

Training Chasers for Top Production

When a new set of chasers, as shown in Figure 3, is delivered to the production floor, it was obviously ordered to thread a particular material and the chamfer and face grinds are as they should be. The manufacturer of the chasers has made sure of that. If anything goes wrong after the tools have had their first shave in the plant where used, all concerned should hold their shirts on until the source of trouble has been located. Before the chasers are put to work, they should be taken to the inspection department for a check-up of hardness, chamfer angle and clearance and also face grind if the latter has a radial hook, angle hook, or snub surface. The main objective is, of course, to maintain the original properties of the entire set which represents, as the case may be quadruplets or sextuplets and they must positively be kept so or they are due to die in their infancy. It makes

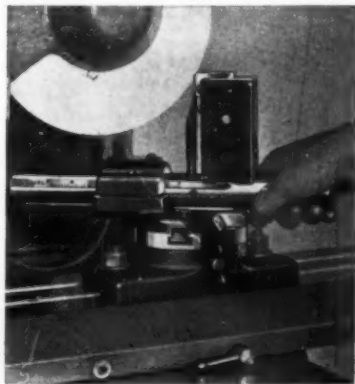


Fig. 8 — In these times, highly skilled hands must be reserved for complicated machining problems. Chasers may well be entrusted to a first-year apprentice if fitting grinding equipment is at hand. This set-up shows the grinding of chamfer angle on milled chaser, preceding Figure 7 adjustments.

Industrial Uses

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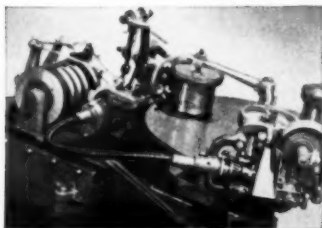


POWER TAKE-OFF

For taking power from the main drive to operate auxiliary mechanisms, S. S. White Flexible Shafts of the Power Drive type are ideally suited. Regardless of the location of the auxiliary mechanism, a single, self-contained flexible shaft does the job, in contrast to the complicated assembly of parts otherwise required. Simplicity, ease of application and economy make it worth while to consider a flexible shaft every time a power take-off problem comes up.

A TYPICAL EXAMPLE

In this sock making machine the flexible shaft carries the power from main drive to trimming mechanism at the right. When you consider other possible means for doing this you appreciate the advantages of the flexible shaft.



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BULLETIN 1238 gives details about S. S. White Power Drive Flexible Shafts available in diameters from 0.43" to .750" and in a broad selection of physical characteristics. WRITE for a copy today.

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sense that a slight deviation with each grind will multiply itself, and eventually the original touch cannot be accounted for. Hence the reason for keeping a timely record of the tools.

The fact that one has an appropriate fixture and follows the rules is by no means a 100% guarantee against abnormal depreciation. I call it a 50% protection only. The wrong grinding wheel has ruined many a set of chasers the very first time they were reground. This frequently occurs in plants where the grinding wheel supply is limited, or when the work is intrusted to some one who lacks knowledge along these lines. Personally, I regard the servicing of chasers as one of the most delicate tool grinding operations, due to their fine cutting edges. I recommend the so-called white wheels, 6" or 7" diameter and $\frac{3}{8}$ " face; 3846-J-5B, Norton analysis, or equivalent. It is important that a maximum surface speed be maintained. On the other hand, it should not be excessive.

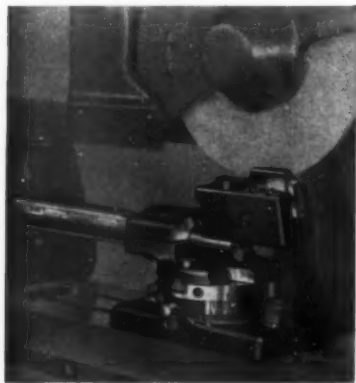


Fig. 9—Face grinds of chasers are executed with this set-up, with traverse movement individually preceded with a .001" transverse feed. Stop-set cross carriage simplifies identical stock removal from each chaser.

With the grinding of chasers, a secondary polish-grind, as recommended in the May 1940 Machine Tool BLUE BOOK, may be disregarded, taking more cuts and removing no more than

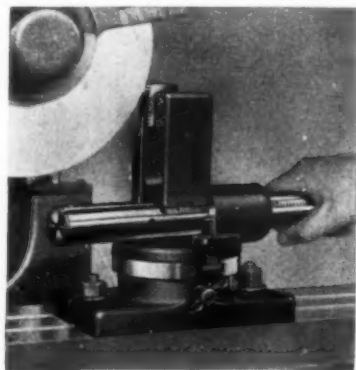


Fig. 10—With a change to slide bar for "taps" radius scale, the fixture is set up for chamfering collapsing tap chasers. Complete fixture adjustment facilities plus machine table stop-setting assure swivel-ground uniformity of the entire set.

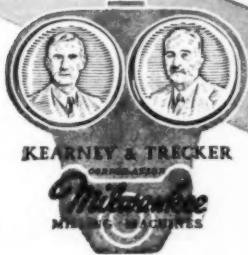
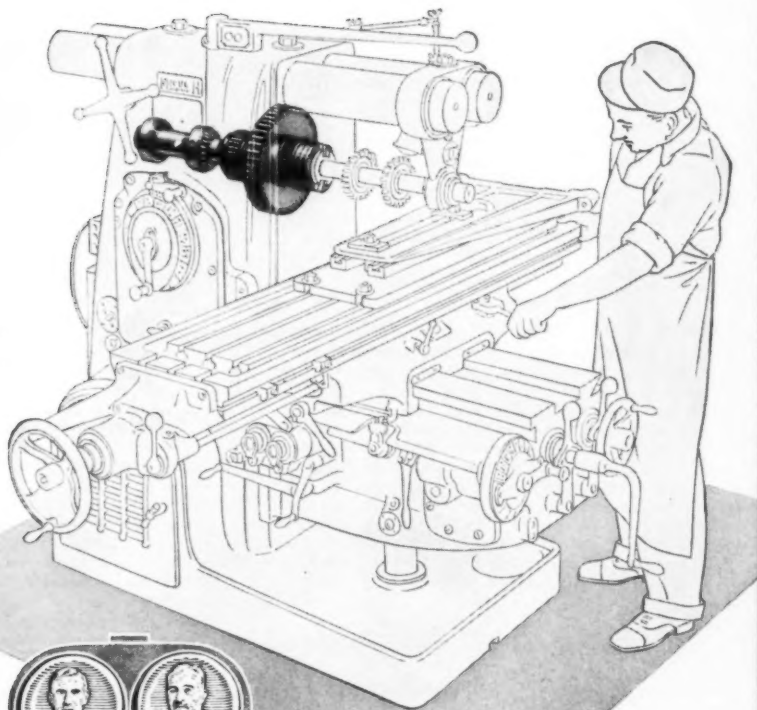
.001" per cut with the wheel specified. With chasers, I make an exception and still regard the oilstone as a modern means of producing a fine edge. Operators of screw cutting machines should be furnished fine oilstones of various shapes for touching up chamfers and faces occasionally. This practice will hold cutting efficiency at par and thus increase time between grinds. Oilstoning is nevertheless but a bracer, and chasers should be sharpened as soon as dullness appears. The "stitch in time" means a lot in this case.

Additional Chasers vs. Grind Alterations

Next to a high abnormal depreciation average, resulting from a group of causes coming under the heading, "Running Into a Shoulder," is the continuous chamfer and face grind altera-

Addition of the center bearing on the spindle of Milwaukee Milling Machines reduces by one-half the distance between bearings and thus increases rigidity 8 times — (shaft deflection varies as the cube of the distance between bearings.)

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MILWAUKEE MILLING MACHINES

tion of chasers to thread different materials. One is often compelled to cut down a 15° 3-thread chamfer to a 45° 1-thread. I still regard this move as a poor trick and call it a mechanical sin to take a hook or radial grind and snub it. This only has to be done twice to cut the life of chasers in half, even though nothing else happens. Any one familiar with chasers, of course, knows that die head chasers come in either tapped or milled thread forms. The fact to bear in mind is that milled chasers should not be face-ground unless this becomes absolutely necessary. It is therefore imperative that the chamfers be given particular attention. As a matter of fact, the chamfers of any type chaser should be considered first, to eliminate as many face grinds as possible, even though a tapped chaser should stand 15 to 20 face grinds for every $\frac{1}{16}$ " of its thickness, if properly serviced.

Running Into a Shoulder

The highest depreciation with chasers results from hitting a shoulder through various angles. This costly inconvenience can be materially doctored by closer attention to designing parts to be threaded. If the intended material has hard machining properties, and realizing that shoulder threading requires a very short chamfer, the risk of getting a full thread close-up is not worth taking. A freer machining material should be substituted, or the design should be so changed as to permit

using a longer chamfer. A neck in connection with external threading, does not on the average weaken the part. The width of this undercut can even be reduced by forming the thread side of the neck on a 30° angle. For internal threading, thought should be given to boring deeper for counterboring or the use of collars. The conditions here related, usually come un-

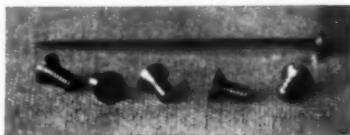


Fig. 11—This is an unusually delicate production threading job. Thread size is No. 0-80 and length is $\frac{3}{32}$ ". Average hourly production is 1025 pieces; 90% O. K. at inspection. Average production between grinds is 90,000; estimated total production per set of chasers, 2,500,000. Material—cold rolled steel.

der the term "hitting a shoulder."

If through carelessness on the part of the operator, or from some other cause beyond control, chasers hit a square shoulder, one of the chasers at least usually "gets it in the neck" and a good size chunk is likely to drop in the chip pan. It would not be so bad if the damage could be evenly distributed over the entire set, but as the case commonly stands, it means depreciating all chasers no less than

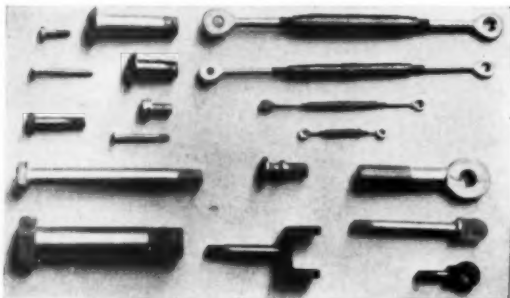
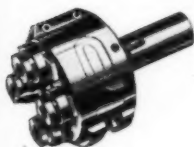


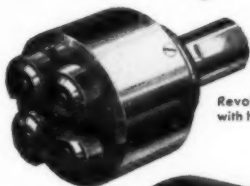
Fig. 12 — High class material and workmanship are essential for these 18 items which are airplane assembly parts. Class 3 fit and better is held on all threads.



Revolving type with hollow mills for Brown & Sharpe Automatics.



Non-revolving type with ground thread circular chasers.



Revolving type with hollow mills.



Non-revolving type with typical hollow milling job.

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With these circular cutter type Namco Self Opening Heads you can change from precision threading to end turning, and forming or necking operations simply by changing cutters and blocks.

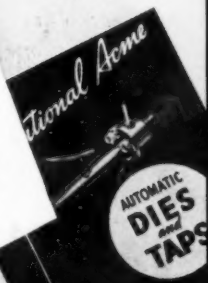
How Namco Precision Heads give 3 Important Savings

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15% from having to regrind all chasers alike.

If the chasers hit a shoulder that is beveled or has a fillet, the same thing happens but probably less seriously.

Misalignment between work-holding component and threading unit will cause endless trouble. The break in this case may not be so deep but might extend far back along the lands of several chasers.

If the work is held in a chuck of some kind, nothing worse could happen if the chasers make a good hit in this direction. Chuck, chasers and threading unit can all feel the shock.

Plenty of trouble is in store when sections to be threaded are out-of-round or oversize; when castings have not previously been turned to size, or when cored holes have not been properly bored and reamed.

A rough cutting-off job is sure to chip chasers badly and this usually occurs with sheared stock.

When a recess is entirely out of the question, special projection chasers are available and should be used. These have a 5° rake on top of projection which creates a single contact point and a chaser is not ruined if a break occurs. It might be mentioned that in one popular design, the chasers protrude through the front of the head and thus permit reinforced shoulder threading with no face plate required.

Speeds and Lubricants

When screw threading, the operator should bear in mind that in proportion to the size of its cutting edges, a threading tool is forced to remove more stock in a single cut than any other metal-cutting tool used. Contrary to a drill, milling cutter, boring tool and the like where the feed per revolution can be established and controlled, the feed of a threading tool is controlled by the pitch. In other words, and for example, 8-threads per inch means $\frac{1}{8}$ " advance per revolution. Proportionately recommended speeds while generally applicable, are nevertheless influenced by the nature of material

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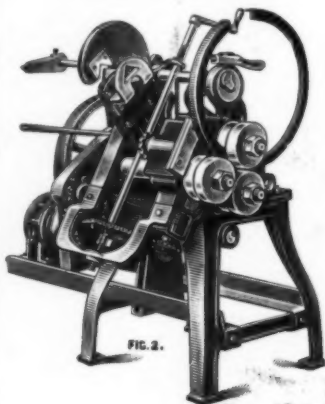


FIG. 2.

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and lubricant. A safe cutting speed is expectedly one that will give maximum production with no bad effects on the chasers and in turn, to accuracy and finish of product. It is needless to mention that fixed indexes of speeds must be disregarded often, as slow-downs are necessary to meet exceptional conditions.

Too much attention cannot be paid to lubrication, which has a direct bearing on both production and threading tools. The correct lubricant for the job, and plenty of it, is a safety-first measure which applies to all metal-cutting projects, but even more so to screw threads. While some material, such as cast brass, cast bronze, cast iron, some plastics, fibre, rubber, etc., are threaded dry, the numerous varieties of steels and alloys require such lubricants as soluble, lard and mineral oils, either "as is" or mixed; paraffin and kerosene oils are also commonly used. The reservoir should contain sufficient lubricant for a very generous flow to prevent overheating. This hint is well in favor of the threading heads also, since it keeps them clean by gradually carrying off dirt and chips and thus prevents abrasive wear.

In conclusion, it is well to assume that for general screw threading economy, no plant can afford to rob Peter to pay Paul with a skimpy supply of chasers, or be without means to give the tools due care.



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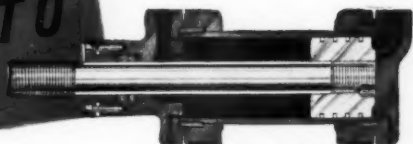
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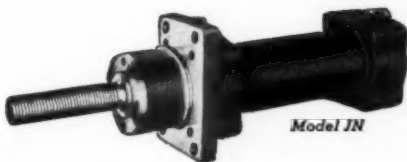
Sectional View

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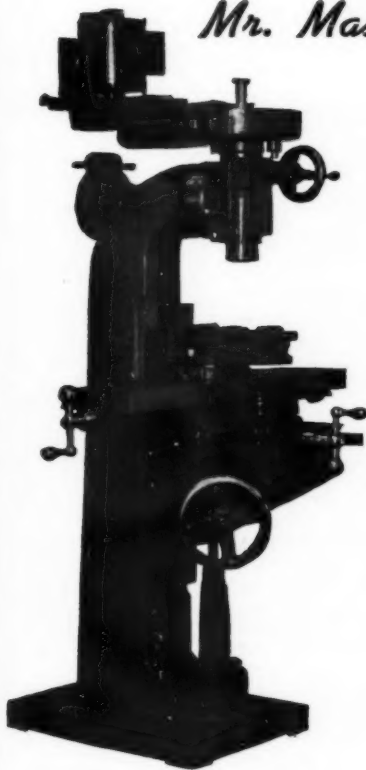
—But that
didn't bother
my pop — !

He had everything all caught up and was ready to go home. You see they have one of those No. 40-H Index High Speed Vertical Mills in the tool room. He milled up the smaller parts for the all important die they were working on. He even did all of the locating and drilling too. The regular milling machines were all busy and the boss had thought they would have to wait at least another day for the parts, so he had ordered the whistle not to blow. When he found out how things had gone, he was very pleased and began to route other work through the Index. It wasn't long before they had two Index Mills, because they found that they could work up these smaller parts so much faster than they had been accustomed; besides this relieved their regular machines for the heavier work.

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Clamp Shoes and Plugs

By H. F. WILLIAMS

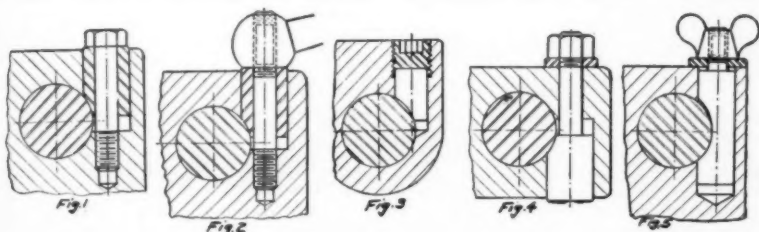
THE first part of this article deals with the use of the tangential clamping plug used with round shafts, whereas the portion in the August 1940 BLUE BOOK dealt only with radial clamping means. When clamping tangentially, an added advantage is obtained in which the angle of contact between plug and work produces greater holding power. In many instances, as will be shown, this can be doubled by using two plugs tightened with but one screw. By the use of levers and rods or by rack and pinion, these plugs can be hooked up in pairs or even greater series, to bind simultaneously, single or multiple parts at various locations with but one movement of the clamping lever. Whether the shaft is plain or threaded, this tangential type of clamp plug can be relied upon to hold firmly.

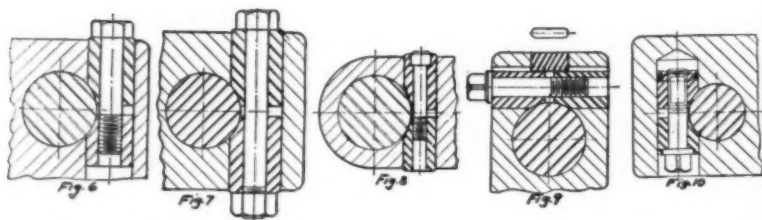
In many cases the clamp plug is made of cold drawn steel, the outside diameter of the rod being sufficiently accurate and having such a tolerance on the minus side to slide freely in a

standard hole. It is usually left in the soft state, as it is usually unnecessary to heat treat it in any way. The ends are chamfered or rounded to avoid sharp corners. The contacting surface can be rough milled and later trued up to correct size with a reamer when the parts are being assembled.

In Figures 1 to 5 are shown various types of single clamp plugs. In the design in Fig. 1, the hole is reamed past the center of the held member and the screw hole is tapped directly into the cast iron part. Sufficient length of thread should be provided. The "hex" head screw should be of such a size as to accommodate a wrench shipped with the machine.

The method in Fig. 2 is similar to Fig. 1, except that a stud is screwed firmly into the cast iron frame. A ball handle, milled off at an angle, is used for clamping. When assembling, the upper end of the plug or the lever contacting face of the ball lever is faced off to bring the lever in the desired position, convenient to the operator, as only a





portion of a revolution is required to loosen the clamp.

In Fig. 3, a smaller plug is used. It is milled past center and has a greater angular contact. It is obvious that clamping power is reduced. A socket head set screw having a flat point is used, thereby giving a flush appearance to the mechanism.

Instead of using a hollow plug as in Figures 1 and 2, the plug is made in one piece in Fig. 4, the smaller diameter being threaded for "hex" nut and washer. In this type, it is often necessary to guide the clamp plug with a key or pin to prevent turning when the nut is tightened.

The clamp plug in Fig. 5 is circular milled with clearance at the upper side. When being tightened (the clamped position being shown in the sketch) the plug is drawn upwards, thereby binding the spindle. This method does not require a guide as the contact is nearly the diameter of the clamp. When the plug is of small diameter, it need not be turned down at the thread diameter. If greater holding power is required, some other form of nut or lever should be used in place of the thumb-nut shown.

For overcoming greater torque, double clamp plugs are used as are shown in Figures 6 to 10. In Fig. 6 the plug hole is reamed through the frame or machine member. The upper plug is made exactly as shown in Fig. 1, but the additional plug is threaded for the "hex" head screw. Some machinists form mill these two plugs separately. Others prefer to make them in one piece, completing all machining opera-

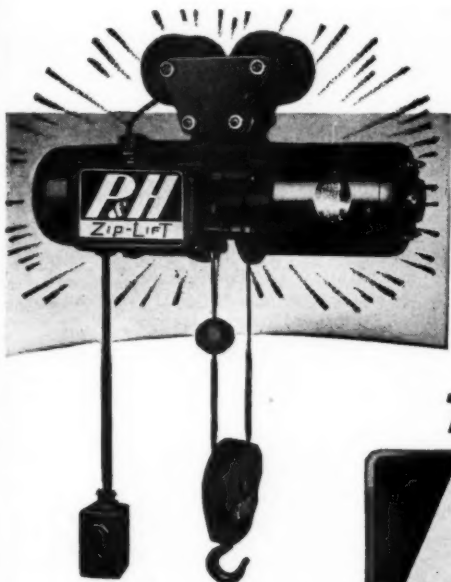
tions and then cutting apart with a cutter, the width of the clearance, at the axis of the held member. Still others assemble the two pieces and with a reamer inserted in the spindle hole, cut the contact surfaces by using the clamping screw as a feed screw, turning in the screw and rotating the reamer at the same time.

When production warrants, the cost of double plugging can be reduced by making both plugs the same in shape and length, as in Fig. 7. Both have drilled holes. A long "hex" head screw is used and held with a nut.

In Fig. 8, a "through" hole is reamed for the double plug. Instead of a circular contacting surface, each plug is milled off at 25° to the axis, thereby giving a line contact between plug and spindle. For greater holding power, this angle can be reduced somewhat, but if made too slight, difficulty will be encountered when loosening, as the angle will stick, and a babbitt hammer is required to disengage the plugs. A socket head screw is used to eliminate protrusions, facilitating cleaning.

To avoid the possibility of the plugs turning in the reamed hole when clamping, the two plugs in Fig. 9 are keywayed to engage a feather key or spline. The shape of the key is indicated, and has a tight fit in the body above the plugs. The slots are loose enough in the plugs to allow freedom of axial movement. When the contacting surface is greater than contemplated in this design, no key or guiding facility is necessary.

In Fig. 10, the threaded plug has a square groove turned at its periphery,



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to accommodate the single coil of a spring whose diameter is slightly larger than the reamed hole. When assembled in the position shown, outward pressure of the ring prevents the threaded plug from falling out when the lower plug and spindle are removed, although there is freedom enough in the slot to allow easy clamping. The lower plug is made short so that the collar screw will not protrude. A socket wrench is required for manipulating the clamp. A blind hole for the plug is not necessary but keeps the mechanism clean.

Tangential clamp plugs, used either singly or doubly, may be used to clamp two shafts or spindles as shown in Figures 11 to 15 inclusive. In Fig. 11, a single clamp is used, tightened by a threaded ball lever. The plug is slabbled off on opposite sides and gets a bearing in the reamed hole nearly its entire length. In this design, the two clamped members prevent the plugs from rotating when being loosened or tightened.

The lower plug in Fig. 12 is turned down and threaded for the binding handle. The additional upper plug is milled on opposite sides to the same shape as that of the lower plug. If the contact curvature is too slight, some difficulty may be encountered, for when loosening, the tendency of the upper plug is to fall by gravity into a wedging contact.

When the two held members are relatively far apart, an elongated plug can be used as shown in Fig. 13. A closed end slot is milled into the casting with an end mill and the plug is made to slide freely in this slot. If consumption of space is no object, the clamping plug can be made round, the diameter being as shown in the cross sectioned

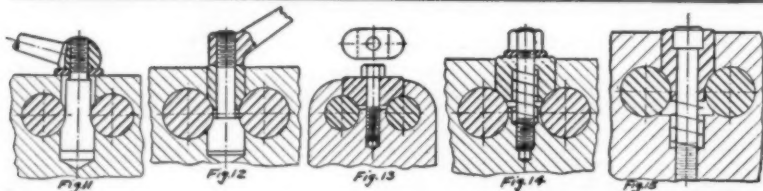
view. This, of course, will give a longer clamping area to the plug and less unit pressure. In this instance, a larger and more powerful screw could be used. This design of plug is more of the radial type than of the tangential type.

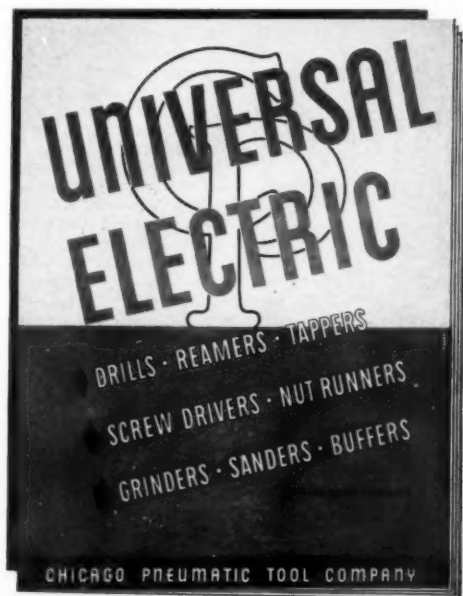
When used in a vertical position, clamping plugs, when loosened, tend to bind rather than to be self releasing, as in the case of Fig. 12. To overcome this tendency, helical springs can be used. When in the clamped position, these springs are always under compression, so that when the plug is loosened, they tend to raise the single plug or to separate the plugs when used doubly.

In Fig. 14, the single plug is drilled out partially to accommodate a coil spring, the lower end of which is centered in the counterbored hole in the casting. The casting is bottom-tapped so that a stud is screwed in tightly. A washer is used under the nut.

When the two spindles are comparatively closely centered, a plug as shown in Fig. 15 can be used. Because there is insufficient metal surrounding the hole for the screw to take a coil spring, the lower end of the plug is made to protrude below the axes of the shafts against which the spring butts. In this method, a socket head screw is used in place of a stud as in Fig. 14.

The method illustrated in Fig. 16 is similar to that used in Fig. 12, except that it clamps one instead of two shafts. In addition, a small but stiff helical spring is inserted into holes in both plugs. If the spindle and clamp plugs are of small proportions, the springs can be used in multiplicity. Also when clamping double spindles, two springs are inserted 90° around





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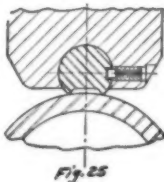
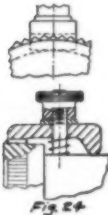
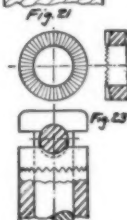
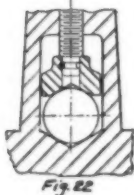
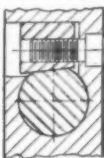
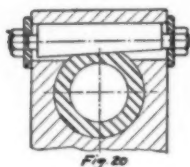
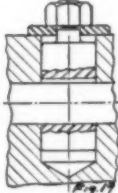
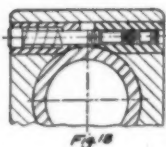
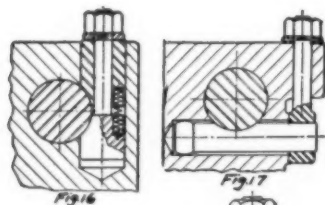
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from each clamping contact surface.

A two piece clamping arrangement is used in Fig. 17. The clamp plug has a ball end and pivots in an enlarged hole. At the middle, it is milled out to suit the spindle diameter. The right hand end fits into a reamed hole in a finished rod-end or eye-bolt. This extends up perpendicularly through the casting and is held with nut and washer. Only a slight turn of the nut is required to drop the plug out of clamping engagement with the spindle.

In some installations, the pressure against the held member must be controlled within certain limits. If the spindle is thin-walled, or where distortion of internal mechanisms might occur, the holding power of the screw, plus the clamping angle may be sufficient to defeat its purpose, namely of binding the shaft firmly against rotation. In Fig. 18, the left hand plug is counterbored deeply to house the head of a socket screw and a helical spring. The spring is calculated to give certain required loads. The right hand plug is tapped to receive, not only the socket head cap screw, but a hollow headless screw as well. The latter is adjusted, either in or out, for lesser or greater pressure. The cap screw is then screwed in against the set screw, locking both in place.

In Fig. 19, the clamp plug is made larger than the shaft to be held. A hole slightly larger than the shaft is reamed through the plug, which slides freely in a reamed hole. By tightening the nut, the plug is drawn upwards, clamping the shaft either side of the hole perpendicular to it.

When the spindle housing must slide at times, the method used in Fig. 20 shows the housing milled off for its length of movement. The cylindrical clamp, in this case, is taper-milled and contacts the flat on the housing. Nuts and washers at both ends permit adjustment for slidability, and at the same time with a slight turn of the right hand nut, the spindle housing will be firmly clamped in any desired axial position.

The shank of the tool, in Fig. 21, is milled flat for a portion of its length.

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One side of the clamp plug is also milled off, the flat being tapered slightly. The plug is tightened with a socket head cap screw. When the tool shank is of same length, two plugs are used. A variation of this method is that of milling a slight tapered flat on the tool shank, thereby obtaining a double taper combination for clamping. In both instances the tool shank has enough freedom in the reamed hole to rotate slightly into proper engagement with the plug or plugs.

In Fig. 22, the tool shank holding frame is broached out with a 120° included angle lower surface, against which the tool rests. The clamping shoe, milled with a similar angle is swivel-pinned to the end of the adjusting screw. The shoe is milled to such a width as to ride freely in the broached opening. The greater the shoe contact in the frame, the less it will ride the sides when the screw is being turned. However, once it contacts the work, it centers itself. Both the frame and the clamp shoe are case-hardened.

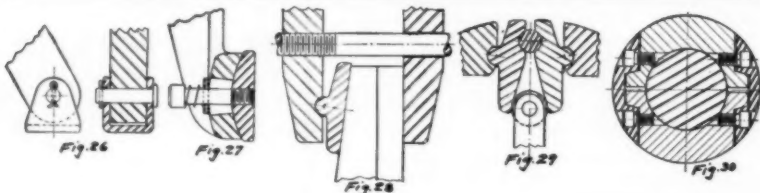
The washer-type binding and adjustable shoe, as shown in Fig. 23, is used primarily for angular adjustment as well as for non-slipping characteristics. The round bar passes through an elongated hole in the headed shank and rests below in a serrated washer or collar. These serrations, 90° included angle in this case, are cut in both collar and lower engaging member. They are milled radially as shown in the plan view and are necessarily cut on an angle as illustrated in the section at the upper right. The peripheral lengths of the outside and inside surfaces and the depth of vee, also the number of divisions, determine the angle of tilt

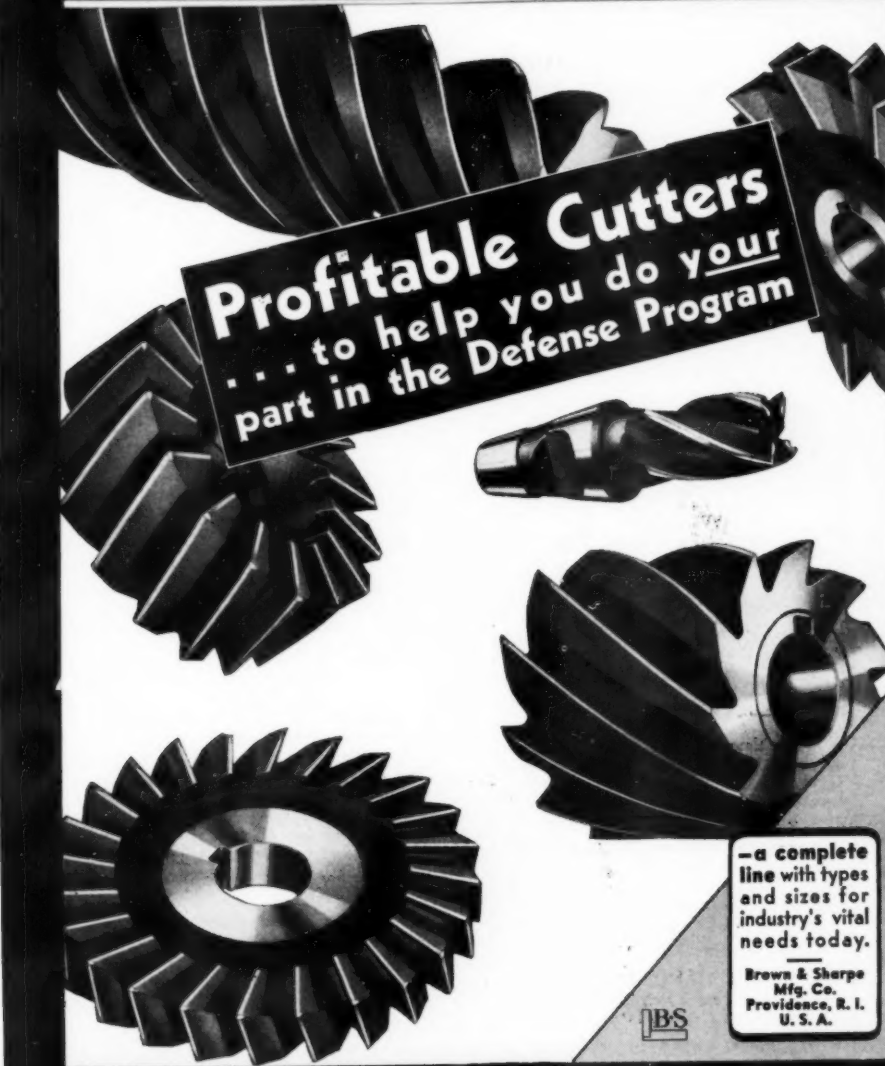
given the teeth. This same method can be used to prevent screw rotation by serrating the head of the screw and making a similarly shaped head on a spring centering pin. The latter is backed up with a compression spring of sufficient strength to keep the teeth from becoming disengaged as a result of vibration.

In Fig. 24 is another form of serrated clamping shoe. The circular member at the left is knurled with a straight knurling tool. The left hand end of the shoe is milled similarly and gets its other bearing at the right. When adjustment is to take place, the knob is loosened, the compression spring raising the shoe out of engagement while pivoting at the rounded fulcrum point. The end view is shown.

A simple but very efficient binding shoe that bites into the work is shown in Fig. 25. The shoe, as illustrated, is made of hardened alloy steel and is form-milled at the periphery for the entire length of the pin. The included angle of the two teeth is 90° . It is used to keep tubular shapes from rotating and is usually employed in sets of three, i. e., is 120° apart. For greater holding power, three sets of pairs are used, or a pair in each adjustable jaw. They fit freely in the reamed holes and are free to turn to accommodate themselves to the work. To retain this plug axially, a headless full dog pointed hollow-head screw is used.

The U-shaped shoe in Fig. 26 is made from sheet steel and is free to swivel. Holes are drilled in the ears for the headed and cottered pin. Sometimes the lower or clamping surface is serrated or roughened in some manner to





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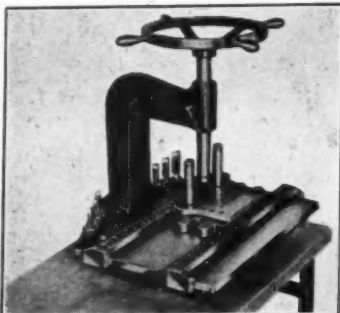
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obtain a better grip. Such a shoe has been made from steel non-slip floor plating, when the work held is of a heavier nature. In the latter case, the pin is naturally larger in diameter.

In Fig. 27, the clamping shoe is more elaborate than shown in Fig. 26, but has added advantages. It is made of heat treated steel and has a rounded back that fits in a concave surface of the movable member, and is tapped to receive two screws as shown. The screws are threaded only sufficiently to bottom and bind at the termination of the threads. The elongated holes in the movable member are long enough to allow the shoe to float through a considerable angle. Between the head of the screw and the shoe backing are inserted a few coils of helical spring and a washer that keep a constant bearing, but allow the shoe to find its own level.

When angular surfaced work is to be clamped, the shoe shown in Fig. 28 is helpful. One clamping jaw has a rounded groove milled near its end to accommodate the swiveling steel shoe which is hardened throughout. It is ground on the long bearing surface and polished at the pivoting end. This type of swiveling shoe has been used successfully in punch presses for holding punches having dovetail-shaped upper ends. It was also used as the movable member of a bench vise, where work having an angular surface up to 15° had to be clamped. In the illustration, the swiveling shoe was applied to a hardened and ground hand clamp.

Fig. 29 shows another use of swiveling shoes, in this instance used in tandem. The shoes pivot about a centrally located pin, made of hardened and polished drill rod. At the lower end of the shoe, a roller contacts the hardened and ground surfaces, thereby expanding the members in contact at the pivoting points. The roller is mounted in the end of a spring loaded shaft, the loading being done when the shoes are expanded.

When a sleeve or hub-type member is to be mounted on a long shaft, such as line shafting, the member is made

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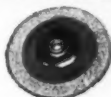
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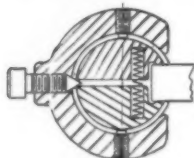


Fig. 31

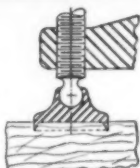


Fig. 32

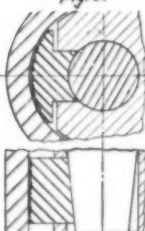


Fig. 33

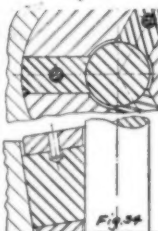


Fig. 34

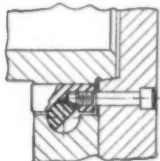


Fig. 35

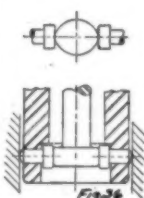


Fig. 36

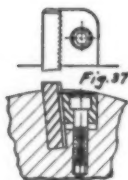


Fig. 37

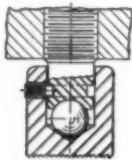


Fig. 38



Fig. 39

in two halves and held together as shown in Fig. 30. This is to facilitate assembling without the necessity of tearing down the shaft bearings. The part is milled with tapered sides, either side of the axis, and accommodates two shoes, tapered suitably for clamping means. The solid member is bored and reamed before cutting apart. The clamping shoes are made of 1045 SAE steel, given a toughening heat treatment and machined after hardening. They are secured with socket head cap screws.

The design shown in Fig. 31 is used, either as a locating mechanism or as an equalizing clamp in jig and fixture work. The end view shows only the working parts and not how the outer member is a part of the fixture body, in this instance, built-up of welded steel. The boss is reamed out to receive the circular hardened shoes. These shoes are turned from solid stock and split apart afterwards. A groove is turned in the periphery of the shoes to accommodate two dog-pointed set screws, the function of these screws being merely to guide the shoes and retain them. The compression spring spreads the shoes apart when not in the clamping or locating position. At the end opposite the spring, tapered surfaces are milled for engagement of a cone-pointed socket head cap screw. This screw forces the shoes apart, which in turn, centers or clamps the work.

In Fig. 32, the clamping shoe, made of hardened steel, is intended to contact and bite into the wood, such as used for a vise or other form of wood clamp. The periphery of the large diameter is recessed to an angular shape, to cause a fairly sharp edge, which upon advancement of the screw, sinks into the wood. The upper end of the shoe is drilled to receive the spherically turned end of the screw. At assembly, this top is peened or spun over the ball to a loose fit. When heat treating, only the biting edge of the shoe is immersed in the cooling agent.

When circular work is to be held against rotation, as in a chuck for hold-

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ing sleeve-like pieces, the design shown in Fig. 33 is quite effective. The heat treated clamping shoe is serrated, coarse knurled or otherwise roughened on its outer surface. The opposite surface is ground on a taper to conform to the largest diameter of the tapered actuating shaft at the center of the mechanism. The sides are ground to fit into the slot in the body, which is further milled to accommodate the widened serrated portion of the shoe. Usually three of these shoes are used in this type of chuck, spaced equally about the center.

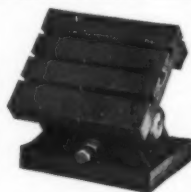
In the arrangement shown in Fig. 34, the shoes are designed to hold work at their internal surfaces, such as chucks for wire, bar or cutter shank clamping. The holding member is milled with three slots having rounded ends. Into these slots are fitted the clamping shoes which resemble feather keys or splines. These shoes, three being used to a chuck, are sweated into the chuck grooves after all pieces have been heat treated. The assembled pieces are ground externally to approx-

imately 12° taper, and internally to the diameter for which they are intended. They are then heated sufficiently to melt the solder used in sweating together and lapped to a free sliding fit in the chuck slots. The chuck is then reground for clearance, both internally and externally, so that only the three jaws contact the work and the surface of the tapered hole. The jaws are retained by the pins at the center of the upper end. It is obvious that the range of this type of chuck is limited to only slight variations of diameter. A series of sizes, such as found in ordinary spring collet chucks becomes necessary.

The cam-type lock shoe, in Fig. 35 is the design used for holding chucks and face-plates on the standardized tapered spindle nose adopted several years ago by the American Standards Ass'n. The round nut is locked in place by means of the cam. The cam is so machined as to have a rise of $\frac{1}{8}$ " in 300° of periphery. Clockwise rotation of the lock-cam tightens the nut. The chuck or face plate is held on the short tapered nose and against the face of the spindle flange simultaneously, by socket head cap screws.

Another type of cam-lock is shown in Fig. 36. A rod is upset-forged and machined with a cam head. This cam engages two headed pins having rounded contact ends. Both cam and pins are heat treated, the contacting surfaces being polished.

In Fig. 37 is shown a method of clamping a cutter blade in such a manner that it is adjustable in two directions. The blade is serrated radially



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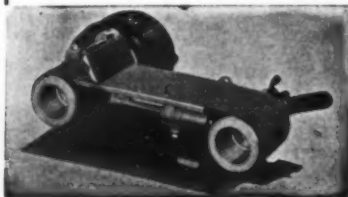
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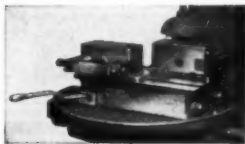
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and these serrations engage similar serrations milled on the clamping wedge, the latter being supported at two faces in the recess of the cutter body. As shown, the cutter blade is in the position when new. When it is to be ground, the clamping wedge is released and moved outward one or two serrations and reclamped. The clamp is held in place by a heat treated socket head cap screw.

The clamping shoe shown in Fig. 38 is serrated in two directions at the lower surface, to form diamond shaped projections. A hole is drilled in the upper end in which rests a hardened steel ball. The end of the screw is turned down and machined with a spherically shaped depression to fit the ball. A groove is turned in the screw end for retention by a dog-pointed set screw. When clamping, the shoe remains stationary, the thrust and swiveling action being taken by the steel ball.

Two methods of clamping by means of Belleville or dished washers are shown in Fig. 39. The washers are made of

.70 or .80 per cent carbon spring steel and heat treated to spring temper. The upper illustration shows the washer being engaged by a flat end screw. In the method shown below, the end of the screw is turned down and used as a pilot to center the washer and is probably the best design. Such washers may be compressed up to 3/16", depending upon the outside diameter, and may be so designed as to carry clamping pressures of several hundred pounds, the latter depending upon diameter and thickness of the material.

In summarizing the many types and designs of clamping shoes, plugs and wedges, the contact surfaces may be divided into three distinct groups. For ordinary work, these parts can be left in a soft state, machined surfaces finished by turning, reaming, milling or facing. This condition is true only where abrasion does not exist. When work is to be held, having "as-cast" or rough machined surfaces, the clamping faces of the shoes take on various irregular shapes. As illustrated, numerous examples in this article and the one that appeared in the August issue of the BLUE BOOK have some form of serrated metallic edges. There are other types of surfaces available, such as the use of safety floor plate, abrasive cloth, roughened wood and forms of rubber matting or molded rubber and plastics.

When finished work is to be clamped, especially where marring of surface is detrimental, then the contacting faces of the clamping members must be quite smooth. In such instances, these parts should be hardened and ground, lapped or polished.

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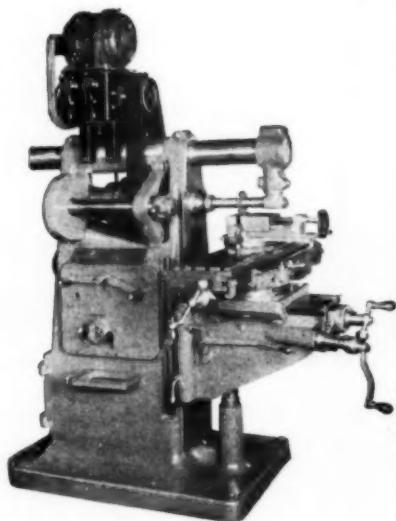
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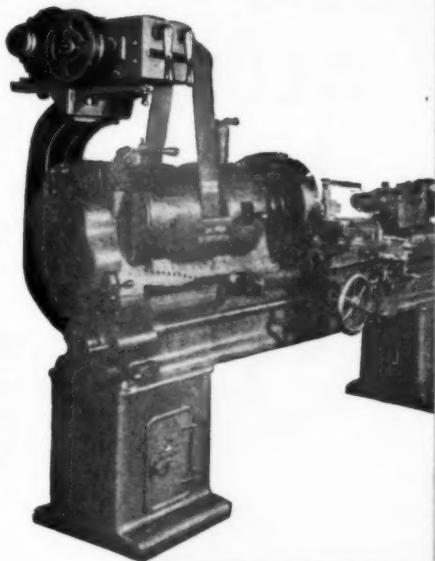
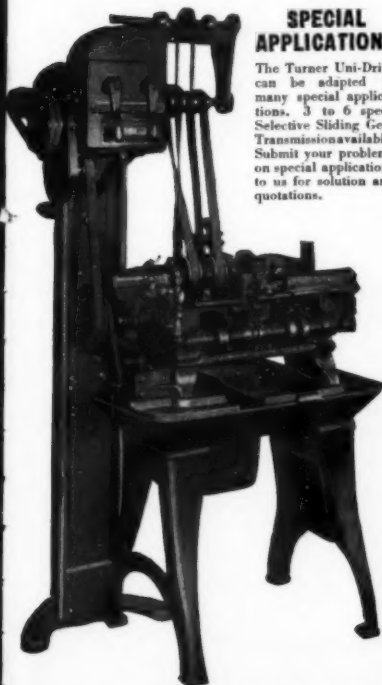
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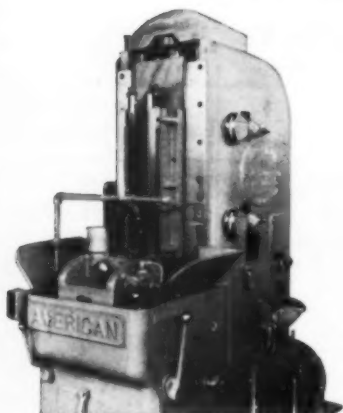
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Punch Press Safety

By WENDELL M. NELSON

EACH step of every operation in modern industry must be planned carefully, and executed according to the plan, if it is to be performed in an effective and efficient manner. By the same token, the safety hazards inherently involved in every group of industrial operations must be studied carefully and the resultant safety measures rigidly observed if these operations are to be performed in a safe manner.

Power presses and their tools can well be considered the most hazardous group of industrial operations, the most fertile field for accident - prevention work.

In general, there are four specific steps to be considered when planning a complete punch press operation, and in each step safety should receive careful consideration. These steps are:

1. Selection of power press.
2. Determination and design of type of die.
3. Selection of a standard guard, design of a special guard for the particular job, or providing other means for protecting the operator.
4. Adoption of safety regulations.

Steps 1 and 2
Selection of Power Press—Determination and Design of Type of Die

The first two steps generally must be



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planned together for a particular job, since the necessary die height, length of press stroke, and required tonnage would limit the press size. Inversely, the shape and size of the punching involved may require the use of a much larger press than the required die tonnage would indicate. If the proper press is not available, it may be necessary to compromise somewhat and reach a "happy medium" between die design and the most suitable press on hand. Due to the many types of work being required on a limited variety of presses, frequently the safety factor is not given the consideration it merits. In no case should the press ever be required to do more than it was designed to do. Tables, which I will not include in this paper, may be obtained readily which will indicate the pressure required for shearing, bending, drawing, and containing information regarding their application to the job at hand.

The punch press crankshaft receives tremendous strain in operation and it is suggested that, each time the shaft is removed for any reason, a magnetic test be given it to detect possible cracks. One large company recently tested a group of 43 crankshafts, finding that 14 of them were cracked, which resulted in replacement. This magnetic test consists of magnetizing the shaft, making the direction of the flux longitudinal so that it will intercept any possible cracks at right angles.

While magnetized, the shaft is sprayed with kerosene which has in suspension finely divided particles of magnetic iron oxide (Fe_3O_4).

Any cracks or discontinuities in the metal will set up magnetic poles, which, while very slight, are strong enough to attract and hold the iron oxide particles, thereby outlining the crack which ordinarily may be invisible to the naked eye.

In the selection of a power press for any type of operation, we should first make sure that the moving parts other than in the so-called danger zone are properly guarded. Special attention should be given to the guarding of flywheels and treadles, the latter being guarded so they cannot be struck and

tripped by falling material. It is best to incorporate in the clutch mechanism the "single stroke" feature. To do this, the trip rod should be so arranged that to trip the press, the pedal must be raised to upper limit each time before depressing. This can be done very easily by a dog on the rod which engages the opposite dog on the piece connected to the tripping mechanism. As the ram descends, the dogs are disengaged and the rod connected to the treadle has to rise to re-engage the dog.

In general, press operations will fall into two groups, namely:

1. Primary operations, i. e., blanks or completed punchings made from raw material handled in sheet, strip, or coil form.
2. Secondary operations, i. e. additional operations on pre-cut or pre-formed blanks or punchings.

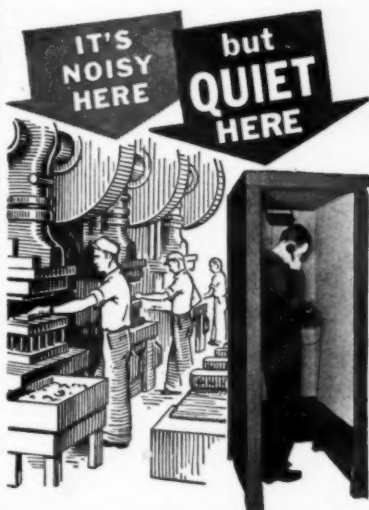
Where the quantity of production is great enough to warrant the expense, dies capable of producing the part as a primary operation are preferable. Since this is not always practical, however, the dies should be so designed as to combine as many stages or "operations" in each die as possible. In any case, it is usually possible and certainly preferable to design the safety features into the die itself in the case of high production. These safety features should take the form of effectively "boxing in" the danger zone.

It should be remembered that all dies are inherently dangerous. In order to perform the intended operation two pieces of metal must "come together" with tremendous pressure. This "coming together" must occur regardless of the design or the safety features incorporated into the die. The area where this occurs is the danger zone, and must be guarded, since it cannot be eliminated.

Several things can be done in the die design to aid in the safe operation of the press:

1. "Cut-a-way" Stripper

In the case of compound-type dies, wherein the punch is set in the lower half of the die, the "cut-a-way" stripper allows the scrap material to be gripped and pulled through more easily without putting the hands too close



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to the danger zone. This is done by actually cutting away the front of the stripper to a point as close as possible to the cutting edge.

2. Proper guarding of guide or leader pins

In the event that the guide pins leave the bushings on the upstroke of the press ram, it is possible for the operator to place his hand between the top of the pin and the bottom of the bushing. When it is impractical to so arrange the pins that they will not leave the bushings, then they should be guarded by means of a telescoping cover.

3. Proper guarding of spring strippers and spring pads

Strippers and pads of this nature should be effectively enclosed in order to prevent dirt, punchings, and even the operator's fingers from getting under them and being squeezed.

4. Stud-type spring pad assemblies on form dies

Studs used on spring assemblies mounted under the die shoes should be of ample size and securely locked to the die shoe. Should this stud break, or become loosened from the die shoe while the spring is under compression, it would fly down with sufficient force to cause injury.

After these items have been given their proper consideration, the type of feed and means of ejecting finished pieces must be decided. Feeds can be grouped into three classifications:

Automatic — Semiautomatic — Hand

Of these, the automatic feeds are the safest and most economical, so high-production jobs are planned to come within this group wherever possible. The semiautomatic feed group rates next, both from the safety and economic viewpoint, while the hand feeds are the most dangerous and the least economical.

A. Automatic Feeds:

Examples of automatic feeds are operations where stock is fed into the press by some mechanical means, such as friction rolls or a reciprocating grip feed.

B. Semiautomatic Feeds:

The greatest variety of feeds fall into



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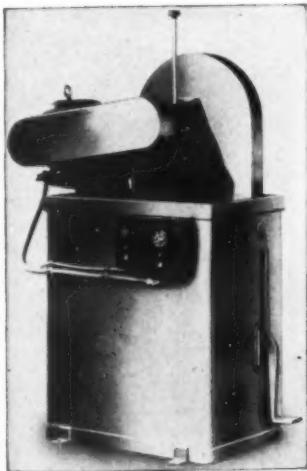
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this group, which includes all feeding performed manually wherein it is never necessary for the operator's hands to enter the danger zone, which can therefore be "boxed in." The following are most commonly used:

(1) Semiautomatic Hand Feed

This consists of manually pushing strip or roll stock into the die from a position outside the "danger zone." An "automatic finger" is incorporated in the die to position the material for each press stroke.

(2) Vacuum Feed

Vacuum cups, mounted on a manually controlled slide arm, or handle, pick up a sheet of material and place it in position on the die. This type is extensively used in such applications as handling large, light sheets of material.

(3) Gravity Feed

Gravity feeds are the most economical type of semiautomatic feeds for press work that can be made. It is probably a fact that many dies in use today could be equipped easily with a variation of this type.

They are essentially an inclined chute with guides for the piece to be worked upon. The piece slides down to the positioning place and usually stops on a locating nest.

(4) Push Feed

This type of feed is somewhat similar to the gravity feed except that the chute is kept filled and work is moved into the working area by pushing new work into the chute.

(5) Push Slide Feed

Push slide feeds are used where gravity and push feeds are not practical, due to the weight or shape of the blank. The blank is dropped into a guide then pushed into the die and positioned by means of a sliding member.

(6) Magazine Feed

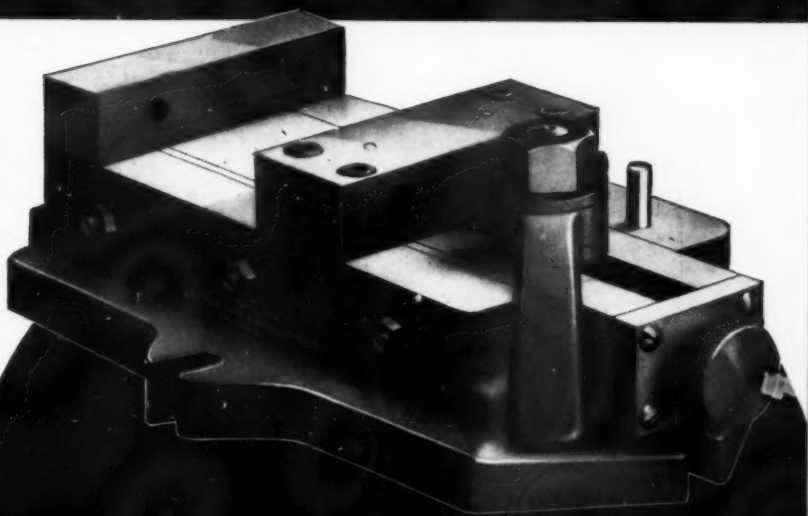
These feeds are necessarily for production of parts where a large quantity is being made.

The speed of production with magazine feeds is, of course, greatly increased.

In this method, a chute or series of guides is kept filled with parts to be worked upon and the bottom piece fed into the machine by means of a slide

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fork similar to the "Push Slide Feed."

(7) Rotary, or Dial Feed

The part to be worked upon is placed in a fixture or positioning device and the whole is rotated by a ratchet or other similar device to a point under the die.

The operator loads and unloads several inches away from the danger zone which can be effectively boxed in.

C. Hand Feeds:

This is the most dangerous method of all and should be used only where and when absolutely necessary. It means that the piece must be placed into the die with pliers, tweezers, vacuum cup, etc., manually. The finished piece in most cases has to be removed in the same manner.

Methods of Ejection

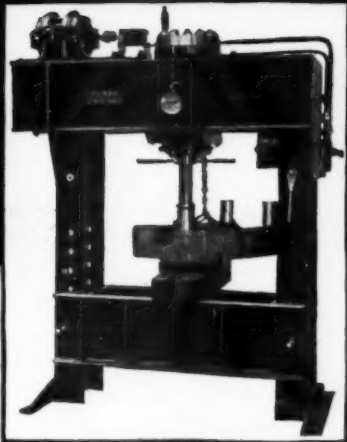
In any classification of feeds, the method of ejection is an important phase of power press work, both from a safety viewpoint and from that of economy. No press should ever be run automatically unless the blanks are positively ejected clear of the die on every stroke. With this in mind, only blank-through dies and those provided with a positive mechanical sweep device or a safety shut-off device can be run automatically. Where gravity or compressed air is depended upon, the press should be so arranged that only one stroke of the press would result from each trip of the treadle, or press-operating lever. Strict observance of this rule would reduce the probability of a "miss," or a closing of the dies with two blanks between them, with its resultant severe springing or breakage of the dies the crank-shaft, or the press frame. Exception may be made for light materials or where the form or shape of the finished piece lends itself to positive ejection.

Note that I repeat that this rule would reduce the probability of a "miss." Rather, it does give the press operator an opportunity to see the ejection failure and to remove manually the completed punching with a wood or soft metal stick before tripping the press again.

Step 3. Selection of a Guard

The ideal guard is one in which it is

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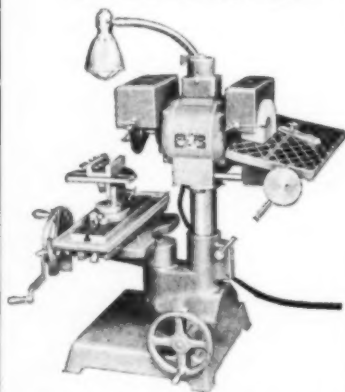
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not only unnecessary for the operator to reach into the danger zone, but it is impossible for him to do so. This is not always possible of accomplishment, so we compromise on a guard in which a maximum of safety is reached without interfering with production.

No guard will prevent the so-called "repeat stroke." For our purposes, a "repeat stroke" is one in which the press was not intentionally tripped.

Guarding or means for protecting the operator properly fall into three classes,

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Aberdeen, South Dakota, U. S. A.

as follows:

I. Primary Guard

This type makes it impossible for the operator to reach into the danger zone during the action of the ram. In other words, the danger zone must be completely enclosed before the press can be tripped.

Examples:—Moving Gate Guard, Stationary Guard.

II. Secondary Guards

Danger zone is guarded only during the time the ram is descending.

Examples: — Sweep Guard, Pull-away Two - hand devices. Of these guards, only the sweep and the pull-away remove the hands from the danger zone if ram descends unexpectedly.

III. Hand Tools

Hand tools are devices used for manual feeding of raw material into press and for removing finished pieces.

Examples: — Pliers, vacuum cups, tweezers, etc.

I. Types of Primary Guards

(a) Moving Gate Guard

Gate is made of expanded metal or bar stock with openings too small to permit entry of fingers.

Clutch is tripped by the moving gate. Clutch tripping should take place at the lowest point of movement.

Side pieces should also be provided to prevent reaching around the gate.

Gate may be arranged to be moved horizontally or vertically.

(b) Stationary Guards

Die is completely enclosed with material similar to that used with the moving gate guard. A small opening is provided for feeding material to the die, but the guard is so arranged that it is impossible for the operator to reach into the die with the hands.

II. Secondary Guards

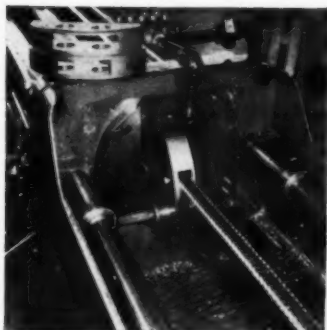
(a) Sweep Guard

This type is composed of a flag attached to a sweep arm connected to the ram of the press. As the ram descends, the sweep swings across the front of the die.

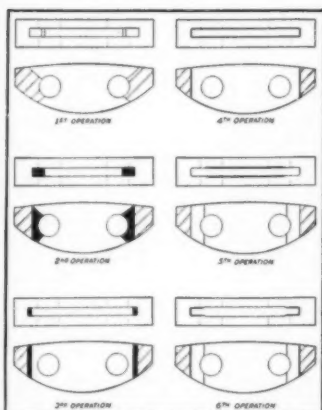
(b) Pull-a-way

This type of guard has cables leading to wristlets on operator's wrists. The other end goes over suitable cam pul-

BROACHING PAYS for JOB LOTS IN AIRCRAFT



Colonial Universal Horizontal Broaching Machine of 25 tons capacity and 72 inch maximum stroke used for the five slotting operations shown here set up for the second and third operations. (See drawing below). Notice large difference in slot width and length between the unfinished and finished counterweights lying on top of the broaching machine.

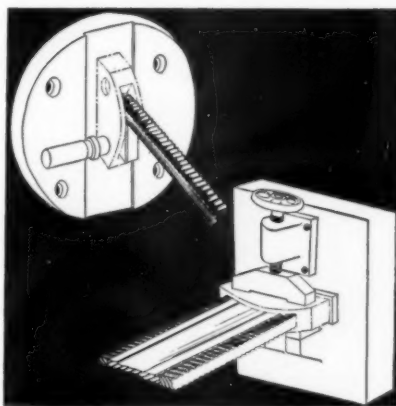


In each operation metal is removed at specified locations to provide the desired final slot form. Heavy lines indicate where metal is removed in each operation.

The broaching machine again proves its flexibility and application to difficult operations in the shops of a well-known aircraft engine manufacturer. Here five operations in slotting the counterbalance weights of a radial type engine are performed on a single horizontal type broaching machine, using but two fixtures and five broaches.

The sequence of operations includes removing excess stock remaining after a preliminary rough milling operation; machining the two ends and sides of the slot in one pass; relieving the center section of the slot, and finally—finishing the total length and width of the slots to accurate dimensions. "Job-lot" quantities are run through each operation before changing broaches, only one change of fixtures being necessary for the entire series of operations.

By using this method of slotting the counter weights, the engine maker has been able to maintain production schedules despite the increased demand for these parts. Proof again that broaching can increase production at low cost.



Only two fixtures are needed for all five broaching operations. The five broaches vary in length from approximately 55 to 15 inches in length and remove from 0.5 inch to a few thousandths per-pass. The fourth, fifth and sixth operations are performed in the same fixture.

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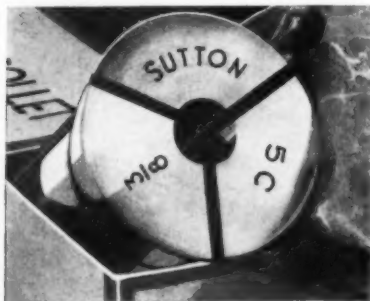
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leys to the ram. As the ram descends, the operator's hands are pulled away from the danger zone.

These two guards are the safest of the secondary type, as they effectively remove the hands from the danger zone in case of unexpected stroke. Their greatest drawback is that they must be properly adjusted for each set-up. In the case of the pull-a-way, the operator himself can render it ineffective by forgetting to affix the wristlets.

(c) Two-hand Devices

Many variations of two-hand devices are in use. They may be electrical push-buttons, air valves, or mechanical levers so arranged that both hands must be used to trip the press. They should also be so arranged as to make it impossible for the operator to tie either of them down, rendering them ineffective, or to reach either of them when his hands are in the danger zone.

To illustrate, if the controls were placed at the outer front corners of a small press, it might be possible for the operator to hold one down with his arm, thereby allowing the press to trip with his hand or fingers in the danger zone.

III. Hand Tools

Pliers, vacuum cups, tweezers, and other similar devices make it necessary for the operator to put his hands into the danger zone. They are by no means fool-proof but are necessary under certain conditions.

All hand tools should be made of brass copper or other comparatively soft metal. They must not be made of tool steel or tempered material, because in case ram descends on tool the pieces might fly and injure the operator.

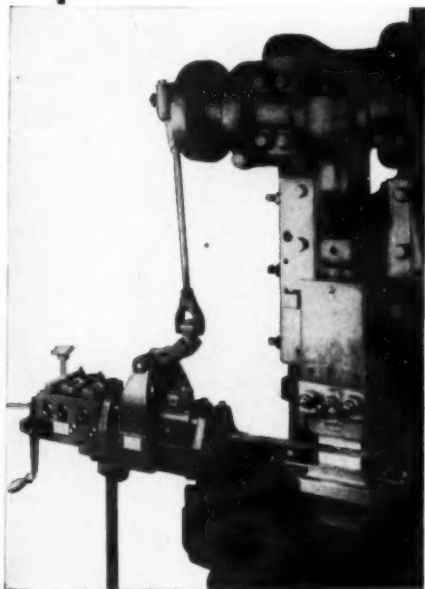
Step 4. Adoption of Safety Regulations (1) For Supervisors.

(a) No press should be put into operation until safety devices, chutes, and other equipment have been installed.

(b) Periodic inspections should be made by men acquainted with operation and maintenance of punch presses, with authority to stop any machine considered unsafe.

(c) Safety devices and clutch mechanism on any press are sub-

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Slide Feeds are also built in larger sizes for special requirements.



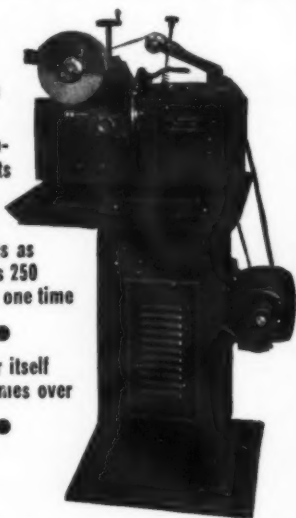
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jected to considerable vibration, wear and abuse, so close checks must be made to maintain proper operating conditions.

(d) Maintenance of punch presses should be done only by men thoroughly trained and acquainted with all phases of press equipment.

(e) Operators should be instructed to call to supervisor's attention any unusual behavior of equipment or tools.

(f) Supervisor should give immediate attention to any report concerning faulty equipment or tools.

(2) Operators

(a) At the beginning of each shift, or after an absence from the press, carefully try the press until satisfied parts are working properly.

(b) Notify supervisor of any unusual behavior of the equipment or tools.

(c) Make sure all guards and safety devices are in place.

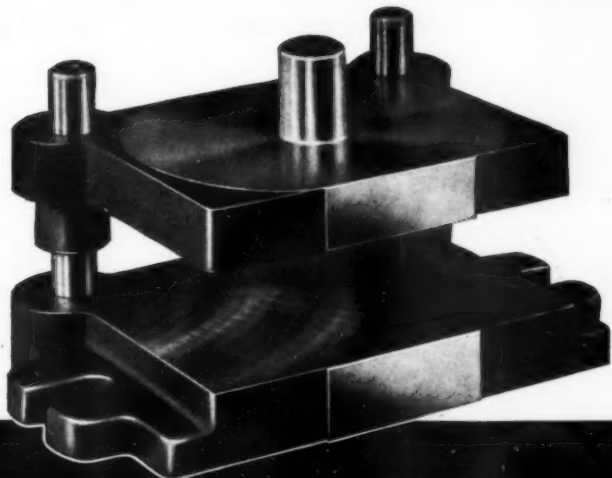
(d) Use equipment provided for feeding or removal of parts.

(e) If piece sticks in die remove with stick or soft metal tool, or report to supervisor.

(f) Do not tamper with operating mechanism or safety devices.

(g) Stop press to oil or make adjustments.

The four steps we have just considered in punch press operations are (1) Selection of Power Press, (2) Determination and design of type of die, (3) Selection of a standard guard, design of a special guard for the particular job, or provide other means for protecting the operator and, (4) Adoption of Safety Regulations. With proper consideration of these steps, I am quite sure the number of accidents now occurring on punch presses will be greatly reduced. This means less suffering and more earnings on the part of the employees and more economical operation on the part of the employer.



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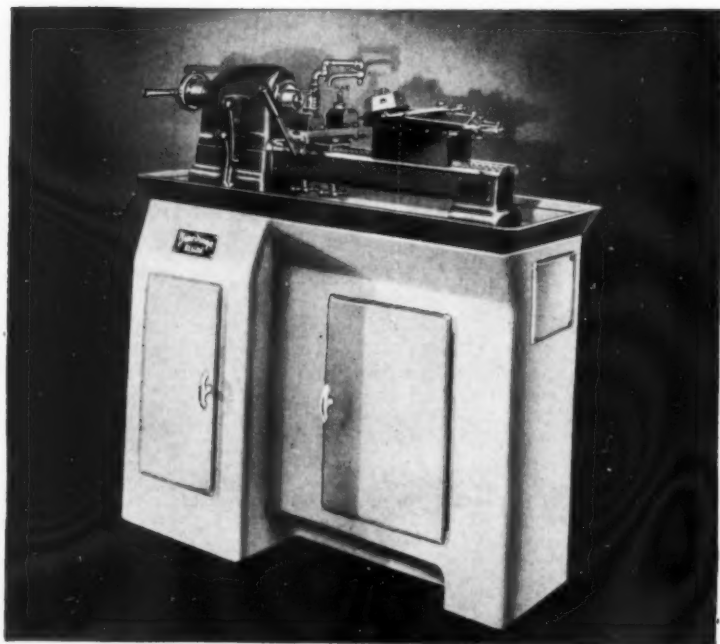
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FIVE operations to machine the slots in the counterbalance weights used on the crankshafts of a well known radial type aircraft engine are now being broached completely on a single horizontal standard broaching machine of 25 tons capacity and 72" maximum stroke, using but two fixtures with four different broaches.

The sequence of operation is shown on the accompanying operation diagram. (Figure 1). After the first rough milling operation, the remaining excess stock is removed in operations 2 and 3. This is done in two steps using the same broach for all passes in both operations. The broach is of a solid type with an effective cutting length of 55". It removes approximately 0.5" of metal per pass. The width of the cut is 0.787". The fixture for these operations (Figure 2) locates the counterweight by a plug placed through one of the reamed pin holes and through a bushing in the arm of the fixture.

In the 4th operation, the two ends and sides of the slot are machined in one pass. Using a

solid type broach with an effective cutting length of 40.25", the width and length of the slot are both increased approximately 0.04". The fixture used is shown in Figure 3, and is of the clamp type.

Operation No. 5 uses the same fixture as for No. 4. Only the broach need

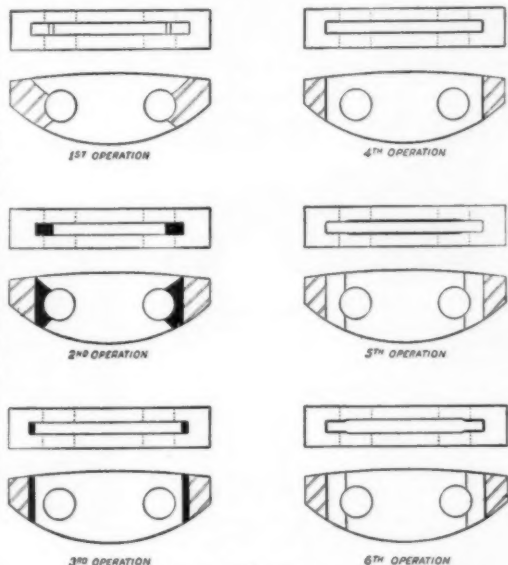


Fig. 1—Sequence of five broaching operations following a rough milling operation used to machine the slots in a counter-balance weight of a radial type aircraft engine.

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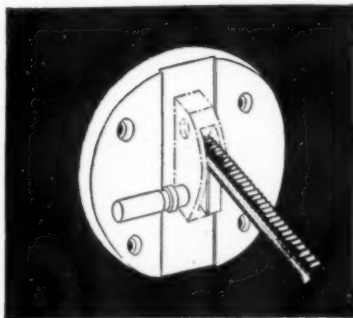


Fig. 2—Operations 2 and 3. Re-
moving excess stock remaining after
milling. Cutting length of broach is
55", removing 0.5" depth of metal per
pass. Width of cut is 0.787". Broach
is of the solid type.

be changed. (Figure 4)—In this oper-
ation, the center section of the slot faces
is relieved about 0.09" in width. The
effective cutting length of the broach
is the same as for Operation No. 4.

Operation No. 6 accurately finishes
the total length and end width of the

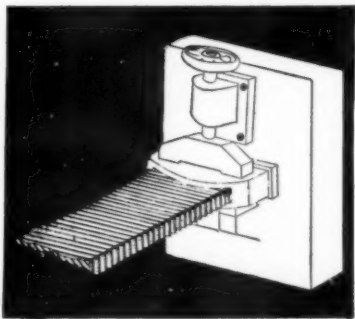


Fig. 3—Operation 4. Machining ends
and sides of slot. Broach cuts on all
four faces. Cutting length of broach
is 40.25". Width and length of slot
are both increased approximately
0.04". A solid type of broach is used.

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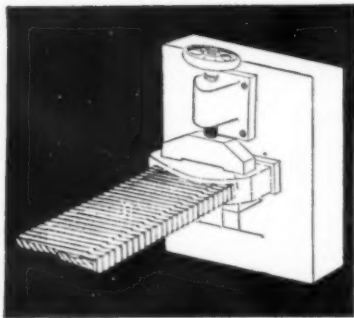


Fig. 4—Operation 5. Relieving center portion of slot. Fixture is same as for Operation 4. Broach cuts on both faces. Cutting length 40.25". Center section of slot is increased approximately 0.09" in width.

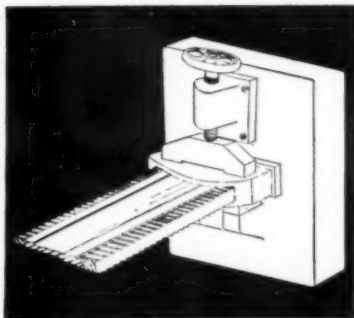


Fig. 5—Operation 6. Finishing slot to specified size. Fixture same as for Operations 4 and 5. Cutting length of broach 15". Broach is of insert type, accurately finishing total length and end width of slot.

slots. Finished slot length must be between 8.362" and 8.366", with similar tolerances specified for the slot width. For this operation, an inserted tooth

type of broach is used, with an effective cutting length of 15". The same fixture is used as for Operations 4 and 5. (Figure 5).

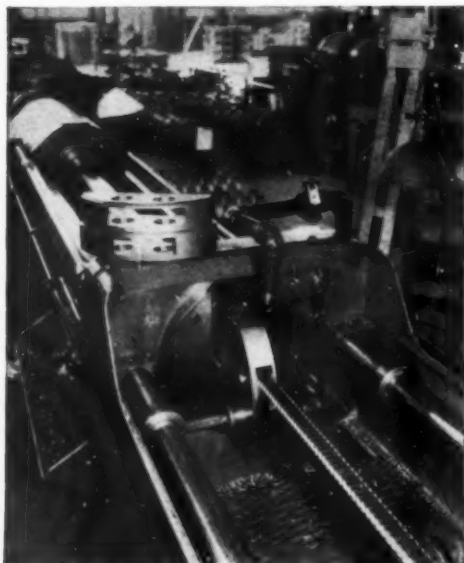


Fig. 6 Broaching machine of 25 tons capacity and 72" maximum stroke used for the five slotting operations shown in Figure 1. Notice large difference in slot width and length between first broach pass and finished counterweight.

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In Figure 6, two of the counterweights are shown lying on top of the broaching machine, which is set up for Operations 2 and 3. The top counterweight shows the appearance after final broaching, while the lower shows one of the weights after the first broaching pass, prior to the second rough broaching unit. Notice the difference in slot length and width even after the first broaching cuts.

In processing the counterweights, a specified quantity is run through each of the broaching operations before the fixture or broach is changed. The adoption of this method of machining the counterweights is said to have enabled the engine maker to maintain production schedules despite the increased demand for these engine parts. Cutting speed for all operations is 30 ft. per minute.



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Drum Fabrication

By FRED O. VOLZ

ARC WELDING in today's applications, is beyond the experimental stage. All phases are definite and under control, and the finished products have the qualities necessary for their intended use as specified by designing engineers.

This known quality of welded construction eliminates the necessity of the addition of material to maintain factors of safety, safeguarding against shrinkage, cracks, warpage, blow-holes, sand-pockets, and other hidden defects. This quality also allows the combination of steels for machinability,—as against the restrictions of sand-pockets and hard spots in castings, etc.

A typical subject in the demonstration of the application of arc welding is the drum. The function of a drum on any hoist, crane, or machinery unit, is

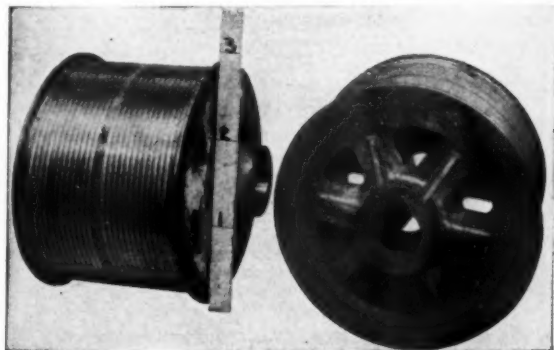
the transmission of energy, and, as a cylinder, to allow the accumulation of the chain or wire rope in as small a space as possible.

The drum, as an important link in hoisting or power units, should have a definite, known factor of safety, long life, and be of good proportions. This requirement induces the use of welded steel without reservation. It eliminates the necessity of guesswork or the addition of metal for unknown internal weaknesses.

Because of the variance in the design factors, such as diameter and length for the storage of the rope or chain, and the rope pull load, it is difficult to standardize on types and sizes of drums without sacrifice to waste and the loss of good proportions.

Three cases are cited, giving exam-

Fig. 1—Arc welded drum fabricated at 29% cost saving for Bonneville Dam.



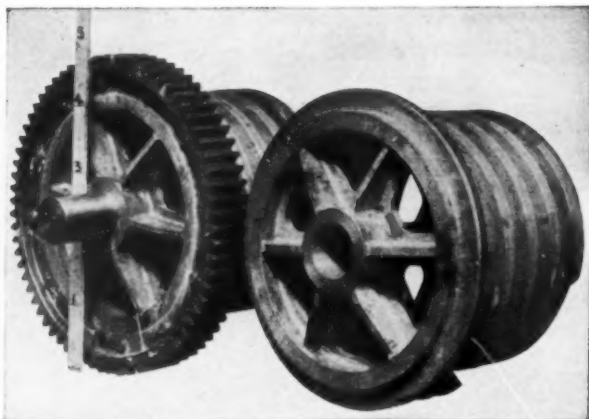


Fig. 2 — Arc welded drums for electrically driven tainter gate hoists for Mississippi River Dams.

ples of welded steel drums built for three different units, which show definite advantages.

The plant in which these drums were manufactured is equipped with modern machinery, and the latest methods of manufacture were used. All of the steel used was of carbon rolled plates, except the hubs, which were of cast steel. Material, operations, and final inspections were made by Government Engineers. The re-designs, and obtaining approval of same, were supervised by the writer, who is in direct charge of the general and detail designing of all welded construction fabricated by this plant.

Case No. 1:

This project concerns the manufacture of six electric arc welded drums for three fish lift elevator hoists. These hoists are for operating the entrance and exit gates of the fish lifts on the Bonneville Project, Columbia River, for the War Department, U. S. Engineer Office, Bonneville, Oregon. They are of a character which required special design to meet the new and unusual requirements of the fishways.

The drums for these hoists were originally designed of cast steel and the approval was obtained from the Engineer Office for the substitution of welded steel construction. To save time

in obtaining this approval, the same arrangement and the same material thicknesses were used. Although the cross-ribbing shown under the shell could be eliminated and was in the re-design, it was added by the preference of the Engineer Office.

This substitution of welded steel allowed for the immediate fabrication, machining, and assembly of the drums into the hoist unit, overcoming the possibility of loss of time due to the making of patterns, castings and discovery of defects in the castings after they were partly machined, which would have been costly due to the work being on a penalty basis. The use of welded construction also showed a saving of \$306.00 for the six drums (\$51.00 per drum), or 29.2%. Fig 1 shows the completed drum, machined ready for assembly.

Case No. 2:

This concerns the manufacture of four electric arc welded drums for two electrically driven traveling tainter gate hoists to be used for the raising and lowering of the tainter gates for Locks and Dams Nos. 4 and 5 on the Mississippi River at Alma, Wis., and Minneiska, Minn., for the U. S. Engineer Office at St. Paul. The hoists travel on a service bridge over the dam, and the drums are grooved for the hoisting

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chains, which fasten to the gates for operation.

After a discouraging experience a few years ago in the use of steel castings for this type of drum on the same kind of hoist, approval of the use of welded construction by the Engineer Office was welcomed.

The welded steel drum was successfully manufactured by accurate cutting of all parts and using covered welding rods. The drum shell, webs and hubs were pre-machined for fitting and assurance against shrinkage cracks. The webs and hubs were normalized and the outside diameter was turned before assembly to the shell. The shell seam was kept clean and peened while welding, to assure solid metal, for it was necessary that no defects such as pin-holes or slag inclusions appear after machining. The drum, after completion, was normalized for stress relief, ground, cleaned, and sandblasted before machining.

After machining of the 1-11/16" deep chain grooves in the shell plate, the seam was not discernable except for a slight difference in the brightness of the finish.

A carbon steel plate 3-1/2" thick was used for the shell, allowing 3/8" for machining, which proved ample due to the accurate rolling of the shell and machining of the webs before assembly.

The use of welded construction guaranteed a saving of time with the assurance of the delivery of the hoists as scheduled, and also gave the advantage of saving of \$1604.00 for the four drums (\$401.00 per drum) or 50.7%. Fig. 2 shows the completed drums after machining, one with the ring gears attached, and shaft in place.

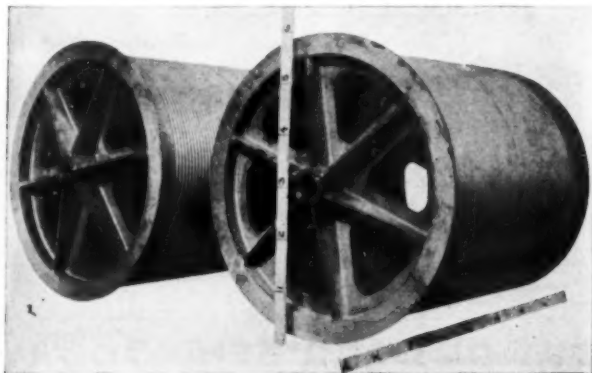
Case No. 3:

This job concerns the fabrication of four welded steel drums used in the building of two 80-ton gantry cranes for the spillway and intake gates of the Pickwick Landing Dam on the Tennessee River, for the T. V. A. These gantry cranes operate on a spillway deck, and are used for the placing and removing of vertical type gates. Four duplicate cranes are in the process of manufacture at the present time, with the use of welded drums.

The Tennessee Valley Authority approved the use of welded steel construction for the drums, although they were specified to be cast. The welded design shows construction heavier than necessary for the imposed loads, for the reason that the T. V. A. Engineers allowed only a reduction of 16% in the thickness of steel over cast iron. This reduction could have been about 30% and be well within the limits of good design.

The shell was made of a 2-3/4" thick plate, rolled in one piece, and the scarf

Fig. 3 — Arc welded hoist drum for 80-ton gantry crane.



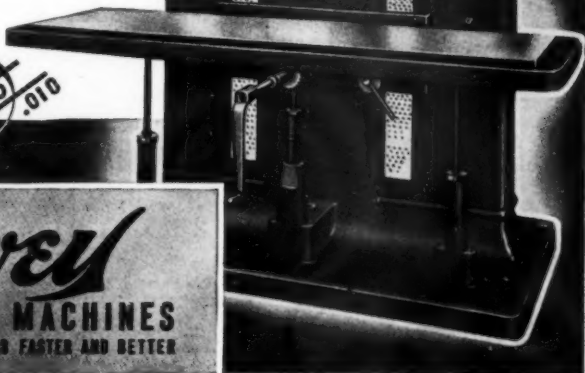
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was machined after rolling. Great care was taken in the rolling of this shell, as only $\frac{3}{8}$ " stock was allowed on the outside for finish machining. The rolling included rough rolling to exact circumference, tack-welding on the inside, and re-rolling to a near perfect diameter. The webs and ribbing were of 1" plates, and the hubs of cast steel.

To obtain the best possible finished drum, the design included machining of the webs, inside of the shell, and outside of the hubs, for tight fitting. Also, the assembly of the web, hub and ribs was normalized after welding, as a unit before assembling to the shell proper, — the outside turning of the web unit being done after normalizing.

The shell plate was welded, after total assembly, with a series of beads using covered wire, each bead being peened after laying. This insured solid metal and prevented distortion of the shell where it was unsupported in the center portion. The finished drum was very satisfactory, and allowed completion of the cranes in the specified time. This crane contract carried a \$100 per day crane penalty clause, and the use of welded steel construction was assurance against payment of any such penalty, for the casting of a good drum of this size is difficult. A saving in net weight over cast iron also was indicated in the design of the structural and machinery parts for the hoist, trolley travel and bridge travel, as the deadweight to be moved was proportionately decreased, the cost of which is not included in this comparison. The net saving in the use of welded drums

over the cast drums amounts to \$1877.00 for the four drums, (\$469.00 per drum) or 42.1%.

Fig. 3 shows two finished drums ready for assembly, and is typical of the good proportions obtainable with the use of arc welded construction.

Conclusion:

The net savings in the use of arc welded drums over cast drums run between 25% and 60%, and the gross savings in a normal year in their exclusive use in the manufacture of overhead traveling, coal and material storage and unloading cranes, shipyard, portal and caterpillar cranes, derrick and mine hoists, various types of dam gate hoists, should approximate possibly 1,500,000 lbs. of materials. On the basis of casting prices at 6c per lb. average, and a net saving of 40% average, this would amount to \$36,000.00 per year with the additional savings of the pattern costs.

The use of arc welded drums also gives freedom of design, a flexibility so necessary in the design of crane and hoist units. Designs can be varied to suit special conditions without penalty of excessive cost. Uncontrollable conditions oftentimes require changes made during or after fabrication of parts, and this can be done. Rigidity and balance are requirements for a good drum, and the welded method insures these qualifications, with the added features of solidity of material and greater known strength. The "rule of thumb" method for the design of cast drums, for the protection against a poor product, should be and can be discarded with this new method of manufacture.



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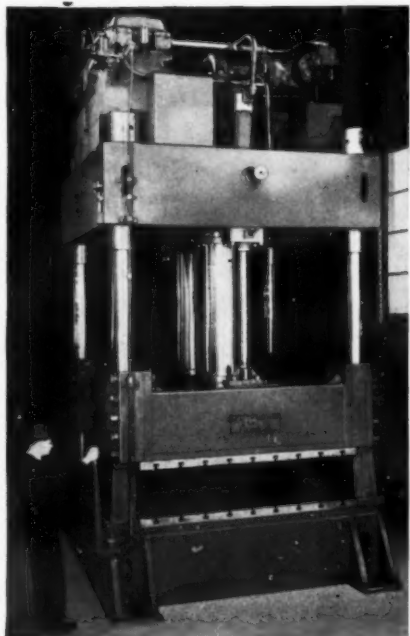
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For purposes of illustration, specifications are given for a typical 600-ton press. While the stroke is 49", the press is equipped with automatic stroke control on the up stroke and may be operated on a short stroke most suitable for the work to be performed, thus reducing

the period required for advance to the work and return from the work.

GENERAL SPECIFICATIONS:

Capacity in tons.....	600
Stroke.....	49"
Maximum opening, stroke up.....	60"

Distance between columns, r. to l.	84"
Distance between columns, f. to b.	84"
Platen size, r. to l.	108"
Platen size, f. to b.	84"

Motor required for operating knock-out cylinder, 2 h. p., 1160 r. p. m. Either of two pumping units may be supplied for operating press. One of these uses a 30 h. p., 860 r. p. m. motor. The other uses a 60 h. p. motor and permits higher pressing speeds.

Tell us your requirements and let us submit detailed recommendations.

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Lag Perilous, Knudsen Warns Tool Industry

WASHINGTON, Dec. 18. — (AP) — An appeal to manufacturers of machine tools and their employees to speed up production in view of the "grave urgency of the situation" was issued today by the chief of the War Relocation Administration.

The former General Motors president wrote the industry that it was imperative to obtain machine tools swiftly for the production of airplanes, anti-aircraft guns, machine guns, torpedo boats, destroyers and tanks.

He told employees in the industry that they were even more important to their country today than soldiers and sailors because without machine tools the latter were helpless.

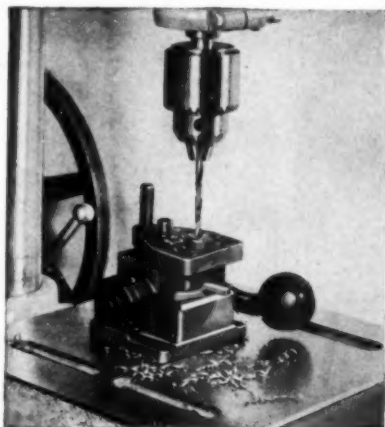
"Working in the machine tool industry is the most important job in the country today," he wrote. "It is the only way to keep the rate of output in the last few years."

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Coolants for Carbide Tools

By JAMES R. LONGWELL

DIFFERING sharply from practice in the machining of cast iron with cemented carbides, coolants should virtually always be used when machining steel with such tools. In cutting cast iron with cemented carbide tools, coolants are of relatively minor importance and are frequently dispensed with altogether. When used, they serve the purpose, largely, of lubricating the flow of chips, or reducing dust, or cooling the tool somewhat.

When machining steel, however, coolants perform two vital functions. They act as a lubricant at a vital point, viz., between the chip and tool. In addition, they quench the chip, tending to stiffen it and making it easier to break. The latter is of vastly greater importance with carbide tools than with high speed steel, due to the greater speeds at which the chips leave the work. A chip, traveling at several hundred feet a minute, can do a great deal of damage if not quickly broken.

While steels can be, and are occasionally cut with carbide tools without coolants, the life between grinds, under such conditions, is usually materially less than when coolants are used.

Machine Requirements

The prime requisite—from a coolant standpoint—in machines to be used for steel cutting with cemented carbide tools, is that they have adequate coolant reservoir, coolant piping and coolant pump capacities. It is frequently overlooked that the vastly higher speeds at which machines can and should be operated when cutting steel with car-

bide tools, involve the requirement of increased coolant capacity and flow.

The two prime reasons for this requirement are that a larger amount of coolant will be in continuous circulation, and that the amount of heat generated (by the greater amount of cutting done) and to be dissipated by the coolant per minute, is greatly increased. Adequate reservoir capacity is necessary so that the coolant itself will remain cool enough to give a temperature differential between tool and work sufficient for the desired effect.

Adequate pump and pipe capacity insures the coolant leaving the nozzle under sufficient pressure to force it against the tool and the work.

Directing the Coolant

This introduces another factor in connection with the use of coolants:—directing them so as to produce the most efficient cooling and lubrication.

In conventional machine practice, the most common method of applying coolants is to let them flow out of a pipe or nozzle over the work, rolling down over the tool. At low cutting speeds—as is the case when high speed steel tools are used—this method is usually quite satisfactory. As speeds are increased to the ranges desirable for use with cemented carbide tools, however, the coolant, when applied in this manner, is carried away from the cutting edge of the tool by the fast moving chip. This results, not only in decreasing the effectiveness of lubricating qualities, but sometimes even in eliminating them altogether.

Another possible source of trouble

involved in this method of applying coolants is that the tip of the tool is not properly cooled, so that when it comes out of the work, after the cut, the extremely hot cutting edge is suddenly struck and chilled by the coolant.

The most effective method of applying coolants when cutting steel with carbides is through pipes — approximately $\frac{3}{8}$ " in diameter—directed in one of the following ways:

1. Pipe the coolant from beneath the tool. In this case, increased secondary clearance should be provided to facilitate coolant reaching cutting edge. (Fig. 1)
2. Pipe the coolant from each side of the tool (Fig. 2)
3. Drill the tool block to form a passage for the coolant through the block, thus permitting an unobstructed flow to the nose of the tool. (Fig. 3)

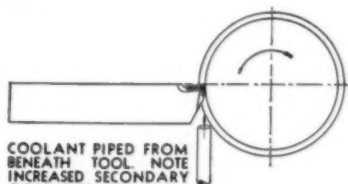
In each case, the coolant should be forced against the work at the tool tip with some pressure for best chip control and cooling action.

Types of Coolants

As to types of coolants to be used, the prime requisite, of course, is that they have good "cooling" qualities. A good soluble oil works well. Here the water is used for the cooling action, while the oil emulsified with it provides the necessary lubricating qualities and rust prevention.

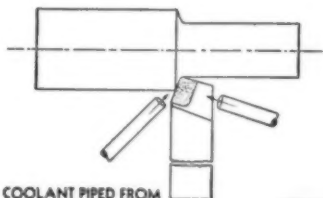
Cutting oils are used in some cases, but have been found objectionable at times from the standpoint of the smoke developed. Furthermore, straight cutting oils are not usually good coolants

at speeds of 200 feet per minute or greater.



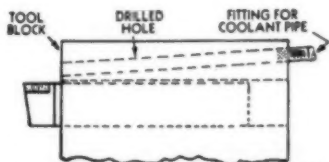
COOLANT PIPED FROM BENEATH TOOL. NOTE INCREASED SECONDARY CLEARANCE TO FACILITATE COOLANT REACHING CUTTING EDGE.

Fig. 1



COOLANT PIPED FROM BOTH SIDES OF TOOL.

Fig. 2



METHOD FOR PROVIDING INDIVIDUAL COOLANT SUPPLY TO EACH TOOL

Fig. 3

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Broaching Fixtures

IN THE machine shops of a well-known manufacturing company, where parts for motor truck trailers are produced, broaching is now being profitably applied in processing some 60 different parts in job-lot quantities. A single broaching press of 15-ton capacity with a set of seven interchangeable fixtures is used. By changing the pads or position of the clamps on each fixture, it becomes adapted to handling several different sizes of each part.

With this equipment the productive rate has been increased remarkably. In many cases it was quadrupled. In one instance, it was three times faster than obtained by a previous milling-machine set-up. It is reported that this increase was obtained at one-fourth the cost of former equipment, including both the cost of the broaching press and all seven fixtures, including time required to change fixtures. The broaching press is of standard utility type with 36" stroke.

More remarkable is the fact that all seven parts in this variety of sizes are produced in job-lot quantities, usually ranging from 300 to 1000 of each size.

Longest runs have not exceeded 20,000 at any time.

Details of the seven fixtures used with the broaching press are shown partly in diagrammatic form for greater clarity:

Fig. 1 shows the fixture used for broaching half round grooves in two shackle bolts at one time. Location for distance of cut from end of the bolt is from the groove shown in the part sketch. The parts are held with a hand clamp. Broach bars are of insert construction. Former productive rate by milling is given as 50 per hour. New rate by broaching—160 per hour.

Fig. 2. This fixture is used for the initial machining operation on "spring chairs." The operation consists of slots in the sides of the casting. One side is broached at a time. To machine the first side, locating is from the rough casting. After machining a number of parts in this manner, the locating block in the fixture is changed. Parts are then inserted with the opposite end toward rear of the fixture, locating the part from the broached surface, to machine the slot on the other side. For-

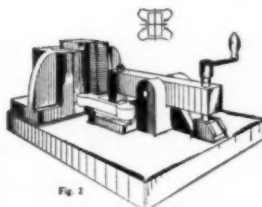
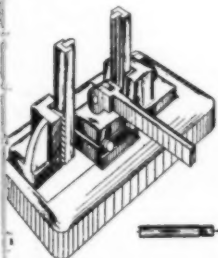


Fig. 2

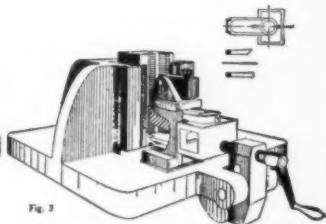


Fig. 3

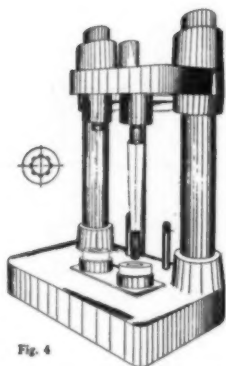


Fig. 3

mer rate—15 per hour. Rate by broaching—60 per hour.

Fig. 3. Initial machining operation on auxiliary spring chairs. Both sides of upper and lower arms of the casting are broached at the same time, the casting being of a U-shape. The upper fork is supported on a solid block in the fixture and held in place by a top clamp. The lower fork rests on a wedge type compensating jack. The clamp to lock the part in place lengthwise is of the receding type, screw operated. Broaches again are of insert construction.

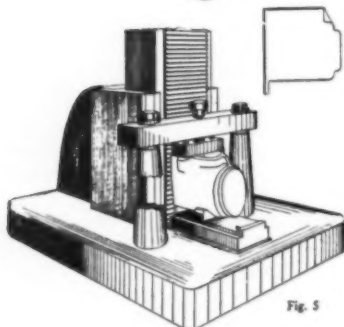


Fig. 5

Fig. 4. Broaching the internal splines on a steel brake slack adjuster gear. Broaches are provided with a semi-automatic handling mechanism. When broaches have been pushed through the work (two parts are machined at one time), they are automatically released by actuation of a plunger attachment on the ram. The broaches then drop into a handling cup below the fixture, the vertical movement of which is controlled by the ram movement. The parts are then removed, broaches are raised by the cup and then snapped onto the ram attachment to return them to the top of the stroke for re-loading the fixture. Rate by old type single pull broach—50 per hour. New rate by double broach—20 per hour.

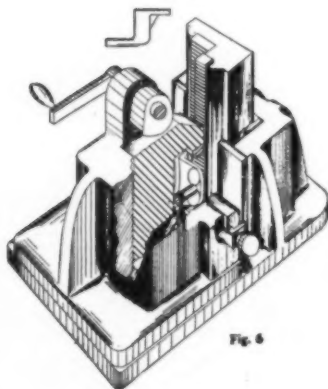
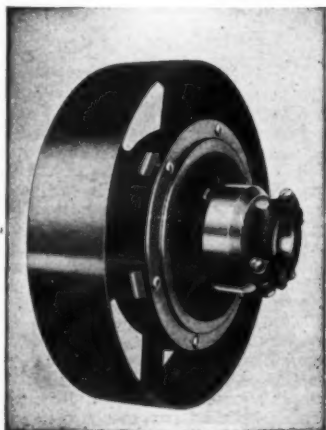


Fig. 6

Fig. 5. A sizeable surface broaching operation is involved in connection with this fixture for machining gear housings. Both faces machined, are broached on the same fixture, in two operations. For the first operation, the part is located on a V-block and locked with a swinging type clamp from the top. For the second operation, positioning is from outside of the locating block (the cored casting clearing the V-blocks used for locating in the first operation) and the part is again locked with the swinging clamp. The same broach is used for both operations. Former rate—10 per hour. New rate—40 per hour.

Fig. 6. Eccentric anchor pin brackets presented a problem requiring in-

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and if you pass the opportunity, your finesse is indeed poor.

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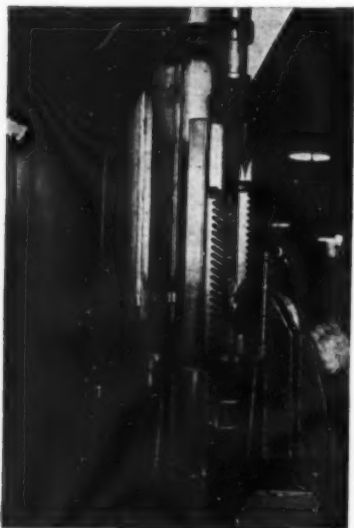
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genuity in designing the holding fixture in view of the intricate shape of the parts. Two surfaces are broached at one time. The shape of the parts



This single Broaching press is now used for processing 7 different parts in a total of 60 sizes in a plant making trailer parts. Usual runs are from 300 to 1000 parts per lot.

required clamping from a rounded surface in such a way as not to obstruct movement of the broach. Since two

surfaces are to be broached at one time, it was not possible to let the fix-

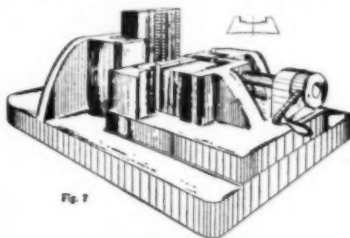


Fig. 7

ture overlap and clamp from one of the flat faces. To meet this condition, the lower support was made Vee shaped to hold the curved portion of the part. This, in combination with the use of side and lower jacks, permitted locking the part with but a single cam-operated clamp. Rate by milling—10 per hour. By broaching—50 per hour.

Fig. 7. The initial machining operation on "spring chairs" is performed in the fixture shown. It consists of broaching the inner face with two broaches inserted in the broach bar. Locating is against the back face. The clamping arrangement is quite ingenious. Equalizing supports are used for this purpose, actual clamping being effected by moving back the equalizer on the far side.

The variety in the type of parts broached on the same press also shows how, with suitable fixtures, a small shop can profitably utilize the flexibility of modern broaching machines for many jobs that often offer processing problems.

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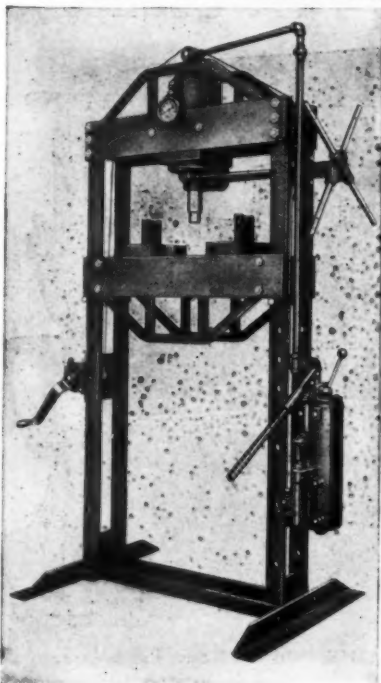
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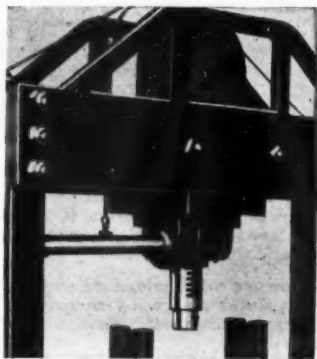
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Note teeth are cut into ram. Rack is not separately attached.

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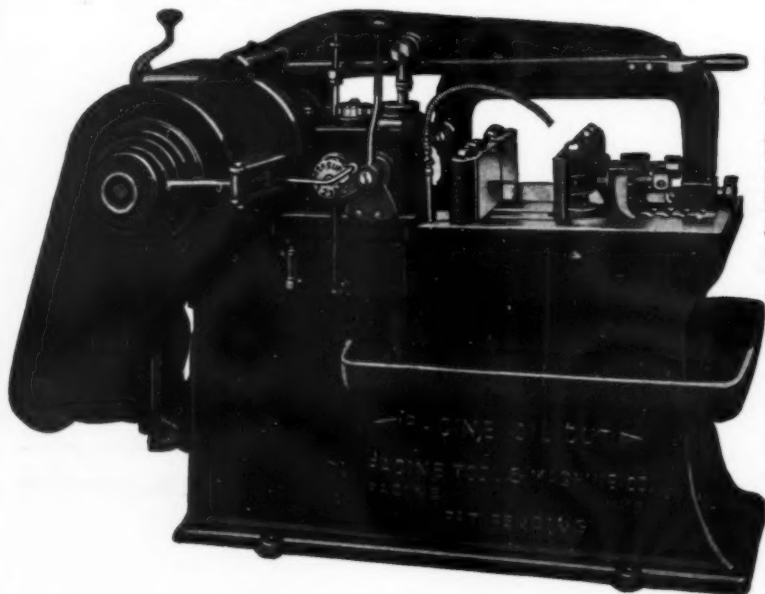
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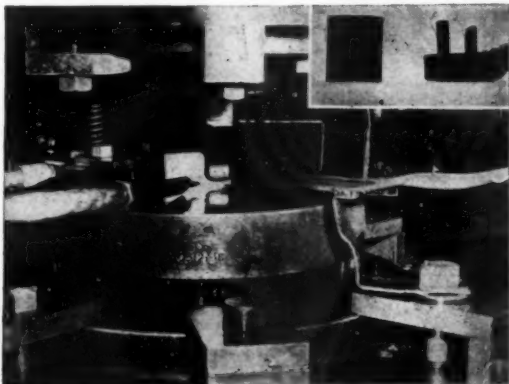
Cold Forging Copper

COLD forging of complicated shape contact fingers from copper bar stock in a single die-forming operation is now being accomplished by a well-known electrical equipment manufacturer. Such complicated parts (see insert on illustration) are not usually considered as lending themselves to cold forging in view of the tendency of copper to seize in the die. This difficulty is reported to have been overcome by a simple but ingenious method of using a dry-lubricating parting compound for automatically re-surfacing the die and punch.

Production is continuous with semi-automatic loading and unloading. To convert the bar stock into the complicated shape desired, the slug is dropped into a die mounted in a fixture on the platen of a vertical press. A shaped punch is then brought down with the ram of the machine under approximately 300-tons pressure, entering the die and squeezing the slug into the proper shape.

Alongside of the press is a tray containing colloidal graphite suspended in oil. The slugs are dropped into this tray and acquire a coating of graphite prior to being placed on the loading chute.

The colloidal graphite, transferred from the slug to the surfaces of the die and punch—under the pressure and friction of the coining operation—is claimed to form what is known as a "graphoid" surface on the parts preventing metal-to-metal contact in the



die and eliminating pick-up and sticking.

Condition of this surface is maintained by the colloidal graphite carried into the die by each succeeding slug. The graphoid surface itself does not have any measurable thickness and thus does not affect dimensions of the finished part. Excess graphite is carried off by the finished part.

With this development ejection of forged parts presents no difficulty. The bottom of the die on which the slug rests, is formed by the top of a slide which raises the finished part out of the die when formed. An air hose then blows the part off the slide into a container on the far side of the press.

The process incidentally has resulted in a surprisingly low die and punch wear, probably attributable to the presence and constant renewal of the graphoid surface.

With this arrangement, production of such contact fingers at the rate of 350 per hour has been accomplished.

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Shop Notes

Pipe Threading Tests

By W. F. Schaphorst, M. E.

FOR cutting threads on pipe, the kind of cutting oil used is more important than is generally realized. It pays to make comparative tests, using various kinds of cutting oils, then figuring and comparing costs after the tests have been run.

For example, here are the results of some actual tests. I must not give the names of the cutting oils, of course, but I will say that No. 1 costs 29c per gallon from the manufacturer and 4c a gallon when mixed, while No. 2 costs 82c per gallon from the manufacturer and 6 $\frac{3}{4}$ c a gallon when mixed.

The tabulations give the number of pipes threaded, while using a full drum of each of these cutting oils. Also, the percentage of good pipe and the percentage of bad threads. It is interesting to note the number of die changes in the two oils. I was not told the cost of changing dies in this instance, but in making the tests, you can easily estimate your own costs.

Cutting Oil No. 1

	Pipe	Ends	Per Cent
Pipe threaded	102,676	205,352	—
Good pipe	90,881	181,762	87.30
Bad threads	11,795	23,590	12.97
Die changes, 816			
Cut per die	125	250	—
Good pipe per die	111	222	—

Cutting Oil No. 2

	Pipe	Ends	Per Cent
Pipe threaded	133,279	266,558	—
Good pipe	128,042	256,084	96.07
Bad threads	5,237	10,474	3.93
Die changes, 375			
Cut per die	355	710	—
Good pipe per die	341	682	—

These tests prove that the first cost of a cutting oil is not of so much importance. The important thing is qual-

ity. Use a quality oil and the ultimate cost will be lower. Low ultimate cost is what we should always seek rather than low first cost.

Holding Air Motor When Reaming

By Arthur Havens

A great many machine parts are assembled with fitted bolts. The holes that accommodate these fitted bolts are both straight and tapered. Regardless of this, the holes must be reamed to insure perfect joints between the parts. Some of this reaming can be done on a drill press but the major part of it must be done by hand at bench or in position on machine or locomotive.

The accompanying illustration portrays a device for holding an air motor for hand reaming. This device eliminates the ever-present danger of the motor swinging and hurting someone, and in most cases makes it possible for the mechanic to handle the job with no assistance.

The apparatus consists of a "U" shaped piece of $\frac{1}{2}$ " by $2\frac{1}{2}$ " soft steel, bent to fit over the motor. This is

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drilled and tapped for a set screw on each side. To this is welded a short length of $\frac{3}{4}$ " standard weight pipe. A link is fashioned for the other end of the pipe, far enough away from the "U" so that it will slip over the handle of the motor and clear the air hose connection. The link is made from $\frac{1}{4}$ " by $1\frac{1}{2}$ " stock, drilled for the $\frac{3}{4}$ " pipe and the motor handle and welded to the pipe.



The guide for this arrangement is simply a long fork with tines of 1" square and long enough to hold and guide the handle of the motor the full length of the reamer. The fork is dropped down through a hole in the bench and holds the air motor in position during the entire reaming operation.

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By Chas. H. Willey

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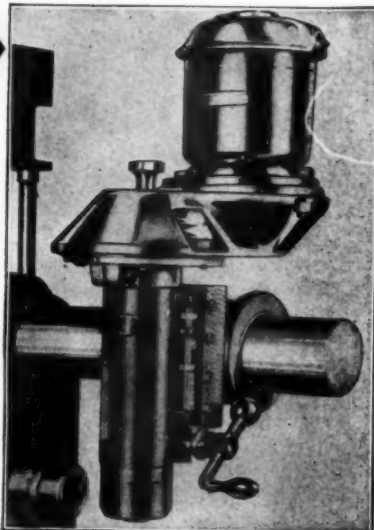
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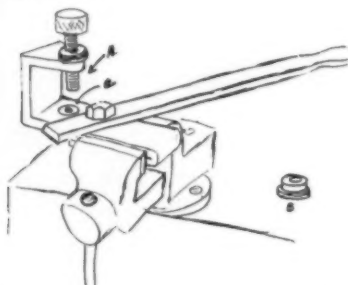
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that can be held in the bench vise or clamped to the bench, so the boys in the shop offered the tool shown in the sketch.



The housing is made from $\frac{3}{4}$ " by $1\frac{1}{2}$ " steel. One end that is held in the vise is bent over double for easy gripping. The other end is U shaped and provided with an adjustable stop and check nut as at "A". Various size

bushings as shown at B are inserted at C. A shear lever completes the fixture. Any screw to be cut is inserted through the bushing till it meets the end of the stop screw. The shear lever is then operated and a neat job is done.

Handy Surface Plate Table

By Arthur Havens

In every machine shop there is need for a bench or table with a smooth level surface to be used for laying out, setting up and assembly of certain fussy jobs.

The illustration shows one that is simple, sturdy and easy to construct.

The top was made of steel, using two pieces of $1\frac{1}{4}$ " by 12" by 24", welded together to make a surface, when finished, 24" square. This plate was finished all over and then marked with a sharp pointed tool into 4" squares. An angle iron frame was made for the plate, the frame with legs attached standing about four feet high. The plate was leaded into the frame and then



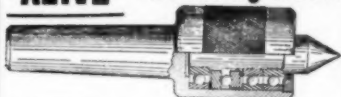
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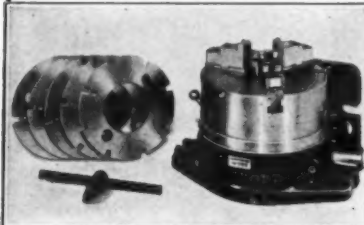
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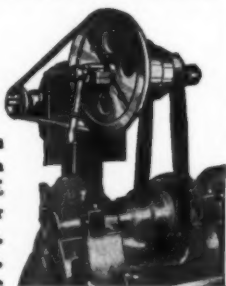
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the whole assembly, leveled and the legs leaded to the floor. Later it was discovered that a shelf would improve the usefulness of the table so a square

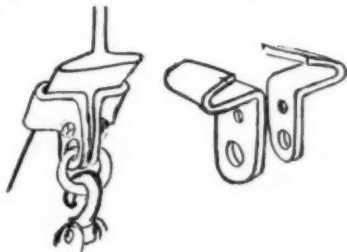


of $\frac{1}{4}$ " plate was sheared to size and welded into place about 14" from the floor. Many uses are found for this table and it is considered one of the handiest homemade pieces of equipment in the shop.

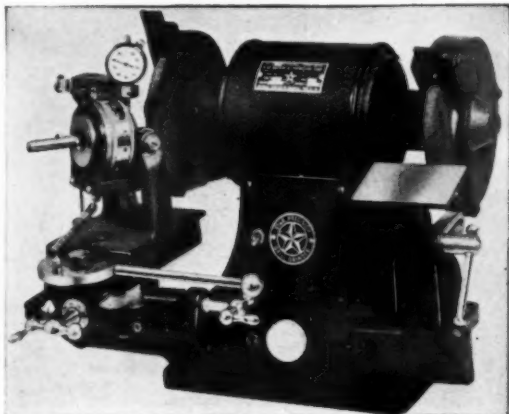
A Rugged Beam Clamp

By Chas. H. Willey

Here is a design for a beam clamp that was produced in the Navy by one of the Machinist's Mates and used on



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various overhaul jobs about the ship. It is a four piece device, comprising two formed sections, a ring welded in, and a bolt.

The illustration shows the design, also its use. A couple of these will be found very handy for any rigging job.

Hacksaw Blade Grip

By Frank Bentley

Often the hacksaw frame gets in the way. Even the end of it prevents cutting off things necessary to remove. A simple holder for hacksaw blades, or parts of blades can be made from a common square tough rubber bicycle pedal pad. Cut one side of it thru to the hole in the center. The cut can be made perfectly straight by following one of the ribs in the center of one side of the square piece. A hacksaw blade will fit snugly into this, resting against the rubber on either side of the hole. It will make an excellent handle and grip, as much of the blade as necessary extending from the end. This home-

made device will be found very handy on many jobs of repair work where small bolt ends, screw heads, rivets, and other things must be cut in places



where the chisel cannot be used, and only the end of the blade is practical if it can be made to reach the inaccessible part to be cut.

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Research

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Research, always important to industry, is imperative today if America is to prevent recurrence of economic dislocation such as followed 1917-18, according to Dr. Karl T. Compton, President of M. I. T., and Chairman of the National Ass'n of Mfrs. Advisory Committee on Research.

Dr. Compton recommends that all manufacturing companies invest 2% of their gross sales income in research. This is the average found to prevail in 181 companies studied by the N. A. M.

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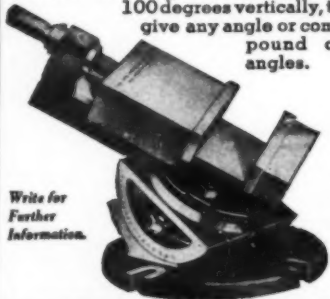
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Belt Slippage

By W. F. Schaphorst

It is well known that all belts slip, but the amount of slip is not so well known and its determination has been more or less of a mystery.

So that any worker can compute the slip of any drive, a rule has been developed. It gives the percentage of slip in any belt:

Add the thickness of the belt in inches to the diameter in inches of the driven pulley. Multiply that sum by the r.p.m., of the driven pulley, and then multiply that product by 100. Call the result "A".

Now add the thickness of the belt in inches to the diameter in inches of the driving pulley, and multiply that sum by the r.p.m., of the driving pulley. Call the result "B".

Divide A by B and subtract the quotient from 100. The remainder is the percentage of slip.

If your belts are transmitting full power, no matter how carefully you are attending to them, you will always get an answer to your problem, due to the elasticity of the belt.

If the answer is two per cent or less you can consider your belts in "good condition" as far as slip is concerned. But if the result is much greater than two per cent, there is something wrong—the slip is excessive and perhaps entirely too expensive, consuming power, as it does, year in and year out.

To compute the cost of excessive slip for one year, use this rule:

Subtract 2 from the answer obtained by applying the above rule (provided your answer is greater than 2). Divide the remainder by 100. Multiply that by the cost in dollars of one horse power per hour. Then multiply that by the h.p. delivered by the engine or motor to the driving pulley. Then multiply that by the number of work-

Clean,
SHARPLY DEFINED
Scribed Lines
SECURED QUICKLY, EASILY
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Micro
Supreme
LAY-OUT DYE

TRIAL OFFER: A handy five-ounce Combination
Brush-In-Can... ideal for shop use and for
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& CHEMICAL COMPANY**
6346 E. Jefferson Ave., Detroit, Mich.



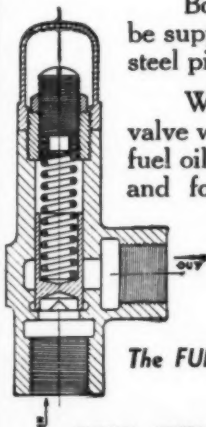
Non - Chattering ... Bypass Piston Type Oil Relief Valves

An important use of these modern valves is in connection with oil hydraulic pumping units, where a specific pressure is required to be maintained, especially on machine tool hydraulic mechanism, oil burning equipment, rams, presses, etc.

The cylindrical piston closes off the port in a shearing manner and does not seat abruptly against body of valve, thereby overcoming any pounding or chattering noise, ordinarily encountered with standard valves using disc seats.

They are made in pipe sizes from $\frac{1}{4}$ " to 2" and are suitable for pressures from 0 to 350-lbs., with a change of but five different springs for the pressure variation (state pressure required when ordering).

Bodies may be of cast iron or brass and can be supplied with brass, hardened steel or stainless steel pistons.



Where fuel oil is used, we recommend a brass valve with stainless steel piston, due to the fact that fuel oil contains a certain amount of condensation and foreign matter, and a harder, non-corrosive piston is required.

FULFLO Valves require no attention after being installed and set for the required pressure.

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ing hours per year. The answer is the cost of excessive belt slip per year in dollars.

For V-belts the above rules apply equally well excepting, that one must use "pitch diameters" of the driving and driven pulleys instead of outside diameters, and the thickness of the belt is "zero." In other words, neglect the belt thickness when computing V-belt drives.

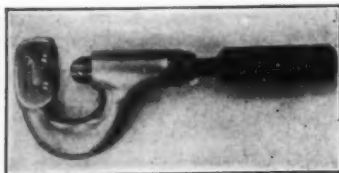
Rebabbitting Bearings

By W. F. Schaphorst

As most large concerns are now equipped with welding outfits, such equipment can be used to advantage in renewing babbitted bearings.

Instead of removing all of the old babbit, melting, making a mandrel, placing, pouring, cutting oil grooves, etc., the better and more modern method is simply to remove the shaft or the bearing and then build up the babbit with the welder until the proper thickness is attained. Do not fill up the oil ring grooves or the oil holes.

In this way, bearings generally can be completed in a much shorter time than is possible by the old method and the final cutting operation or "machining" requires practically no time at all. There is small chance that the bearing will warp out of shape because of overheating or internal heat stresses. Surely this method is worth knowing about.



WADE Knurling Tool

For knurling long or slender work ... easily and quickly, without any bother of adjusting it in the tool post. Knurl is fed into work by the screw on handle. Plunger carrying knurl is keyed so it cannot turn. Tool is 7" long. Maximum capacity is $\frac{3}{4}$ " diameter. Minimum capacity $\frac{3}{32}$ ".

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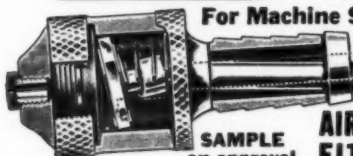
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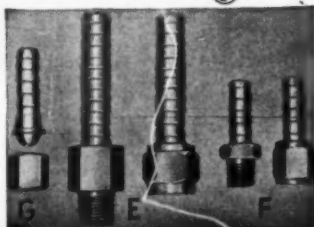
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Handy Corner Clamp

By Arthur Havens

Any one who has watched a welder prepare for welding a square box or other metal article having square corners will appreciate this handy gadget.



While size is unimportant, the device pictured seems to serve average purposes.

The clamp body is flame-cut from a piece of $\frac{3}{8}$ " boiler plate. The part that fits inside is about $1\frac{1}{2}$ " wide and 12" long, before it is bent. The ears are made large enough to bend over, leaving a space between them and the clamp body of about $\frac{1}{2}$ ". Each is about $1\frac{1}{2}$ " long by 2" wide. Before bending, the ears are drilled with a 9/16" drill. The bar is bent to a perfect 90° angle and the ears are formed as pictured. To each ear is welded a $\frac{1}{2}$ " nut. A $\frac{1}{2}$ " set screw is inserted in each ear and the rig is ready for use. Having a number of these handy clamps on hand will assist the welder on angular set-ups.

Driving Small Screws

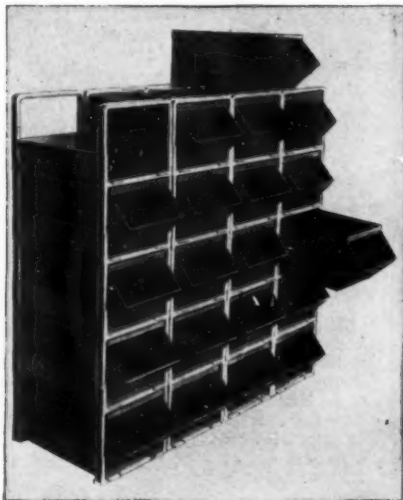
By Frank V. Faulhaber

On some machine jobs it is often a test and a trial when replacing ex-

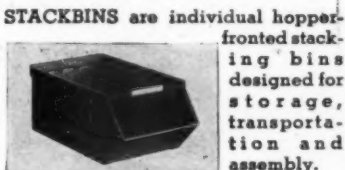
How to Reduce Handling and Speed Inventory Count

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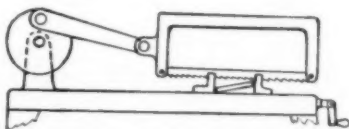
tremely small screws. Considerable time and effort, besides a great deal of patience, is often involved simply because it is difficult to start small screws. The more such screws must be handled, the more likelihood of their straying or becoming lost. This painstaking problem of setting such tiny screws can be solved once and for all by paring down a match, or fragment of wood of corresponding size, so that an end will fit conveniently into the slot of the screw head. This end should be moistened sufficiently, then set into the slot. The moistened end will readily swell, permitting a tight hold of the small screw.

The machinist need no longer shrink from jobs where the field of operations is difficult of access and small machine screws must be inserted. After the screw has been started on its way, the match can be removed, and the job completed with a screw driver.

A Sawing Kink

By R. B. Ware

Here is a rather obvious method of holding work in an ordinary gravity feed, power hack saw to avoid ripping off the saw teeth, and to save time in cutting the stock off.



When the stock is, say 2" or more, wide and 3/16" or so, thick, it saves a lot of time, to clamp the work as shown, especially if the saw happens to be rather dull. When the stock lies flat, the saw has so much bearing that it cuts slowly. And if the stock is clamped up edgewise, it is likely to rip the teeth off the saw.

Keeping Tools in Place

By Frank V. Faulhaber

Often there is considerable loss of time, besides a tax on patience, when making machine adjustments or repairs where the work is difficult of access, because tools get out of hand and are hard to retrieve. It is problem enough



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to seek and to find desired instruments, but to have these slip into inaccessible places hinders the work. Screw-drivers, wrenches, and such, can be kept in convenient places by tying a suitable length of string to the end of the tool being used, the other end of the string being fastened to the mechanic's wrist, jumper, or other convenient place.

This procedure proves particularly useful and time-saving when several tools must be used at the same time, or alternately on the work in hand. Thereby there is a literal string on the tool. Even though it may slip from the workman's hands, and however dark the field of operations and inaccessible, the tool can be drawn back into place without fret, fuss or delay.

Cutting Off Tubing

By John Zeman

You always have a job on your hands to avoid kicking up a burr on the inside diameter of tubing when cutting it off.

Grinding a small radius in the center of the cut-off edge not only helps produce a better cutoff finish on the work, but actually avoids the burr on the inside diameter of the tube.

Undoubtedly, other operators have the same problems on their machines, and perhaps this suggestion will be of real help.

A parting cut is just about the hardest one to manage because the tool is narrow, generally has a long over-

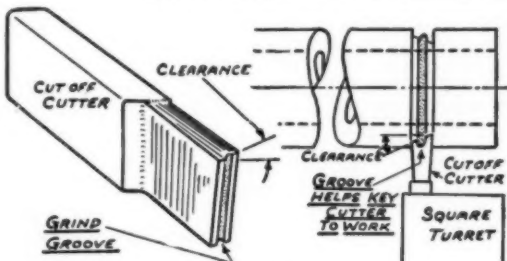
hang and therefore has little rigidity against sideward motion. As a result, it tends to move sideways during the cutoff, marring the finish and picking up a burr on tubing jobs.

Grinding a radius in the end of the tool forms a pilot for the cutter in the work that supports the end of the cutter from this sideward movement. (Courtesy—Warner & Swasey's "Blue Chips")

Porcelain Breakage In Riveting

By Theodore Oshinsky

In plants manufacturing mica and variable condensers, the general practice is to assemble the mica and phosphor bronze plates on a porcelain base. The plates and mica are then secured to the base either by riveting or eye-letting. But this practice, in some plants, has been substituted for the slower method of head-spinning, the



reason being the costly breakage of bases, encountered in riveting or eye-letting. While it may be more expedient to spin than to rivet, there is an obvious sacrifice of production in an effort to save material.



Here's how to get real value from your grinding wheels. Dress and true them regularly. Use Vincent Improved Huntington dressers equipped with Vincent **high-carbon tool steel cutters**. Your mill supply distributor can supply them, and they cost no more than the ordinary kind.

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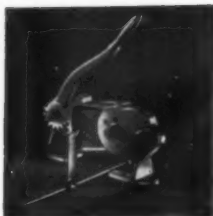
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But, again, this latter method also has its disadvantages in that spinning the head does not always tighten the rivet—an important requisite in assembling trimming and padding condensers.

The problem encountered in using a power driven riveting or eyeletting machine on porcelain or refractory material results from the hammer-like blows of the plunger. The vibrating shocks on the fragile, brittle base are often at the holes where the rivets enter. Moreover, added to this is the effect upon the rivet as the plunger strikes and the tubular rivet commences to curl.

Examining a cracked base, one can readily note the irregular bulge in the expanded body of the rivet. This condition may be due to several causes:—
(1) curling tool not properly formed;
(2) curling tool needs polishing to remove ridges or rough surface. And, after this has been done, the expanded rivet body should be uniformly round. But who can control the bulging of this body as it expands to the walls of the holes in the porous, brittle base? The answer is to ease the binding, expanding body from the hammer-like pressure of the plunging curling tool.

Now, a practical way to overcome this problem—without sacrificing the automatic feed and speed of the riveting machine, is to construct the adapter illustrated. (1) From c.r. steel, turn up the base adapter (A)—or its likeness, to conform to your requirements.

(2) Then make the sleeve (B) to fit the saddle-arm of the machine. Next, procure a piece of hard, round rubber, with a bore to fit the shank of (A).

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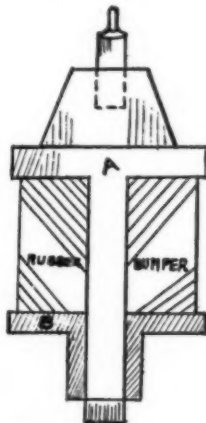
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The rubber should be put in the position as shown in the illustration, where it acts as a bumper to absorb the shocks of each succeeding plunger blow.



Then when the plunger falls and the rivet begins to curl, the pressure is absorbed by the rubber which expands until the rivet or eyelet head is fully curled and sets securely upon the porcelain base.

By cracking open a base the examiner will note the uniformity of the expanded rivet body against the wall of the hole, unmistakable proof of the rubber's efficiency in easing the blow of the tool.

This method has proven highly successful in one of the largest plants of



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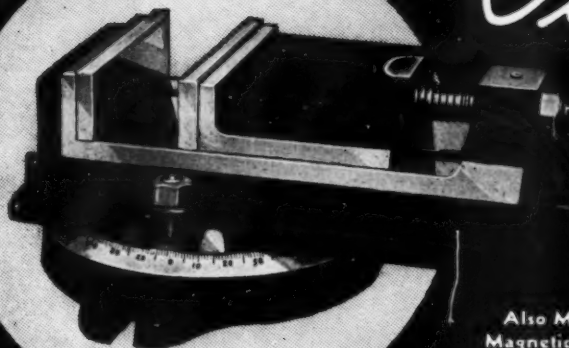
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**85 LB.
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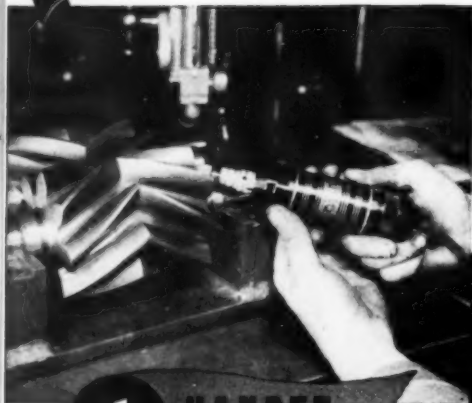
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Let us send a sample wheel. Tell us the kind of job, type of equipment you use and size wheel you'd like to make your own test.

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This Unit can be installed
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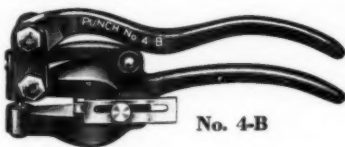
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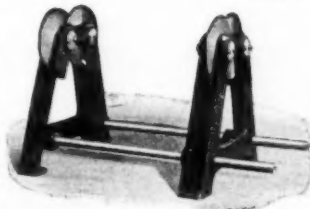
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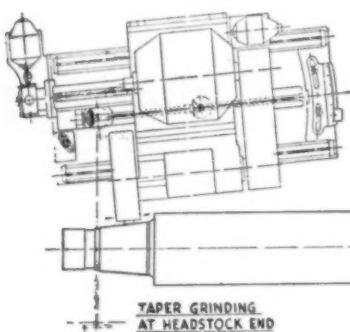
ANDERSON BROS. MFG. CO.

ROCKFORD, ILL.

its kind supplying the radio industry, and needless to say, base breakage has been reduced to a minimum; the cost of tooling is trivial, and the idea is worth trying.

Attachment for Taper Grinding

A new principle is employed in a taper grinding attachment announced by a New England manufacturer. Incorporated in their cylindrical grinder, the wheelhead is mounted on a swivel base, which may be offset in either direction. As a result, both necks of a workpiece such as a roll can be ground without turning the piece around. Original setting is not disturbed, giving assurance that the roll is still true.

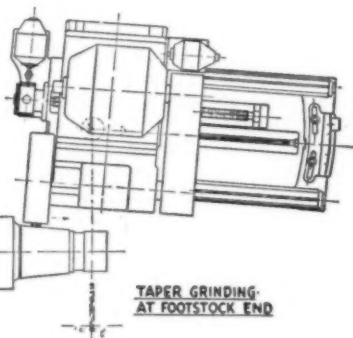


This swivel design is said to give a wider range of angles than is possible with many conventional taper grinders. It will grind tapers equally

well in either direction. Individual motors operate the traveling work table and the grinding wheel traverse. As a cylindrical grinder you have a work moving machine; when taper grinding it is a wheel moving machine. Electric interlocking of the controls prevents the use of both motors simultaneously.

Improving Cutting Steel

Something new is offered in the way of cutting tools which is said to fill the gap between conventional high speed steels and the carbides. The manufacturer declares that this material has a hardness of 65-66 Rockwell C and practically twice the normal strength. It can be ground any way you wish with an ordinary wheel.



This is not so much a new material as it is a new method of hardening high speed steel. Flat and square bits of standard sizes are available, but special

Protect Sheet Steel Against Rust Damage with our Spray Pump and Non-Rust Oil

With this five gallon tank, pump and Protex non-rust oil, one man can quickly rust-proof the edges of thousands of steel sheets. Costly rust damage is prevented at trifling expense.

A quart size pump is also available.

Send for information on this and Mello-matic paste solder, S-R and No-Sep Lubricant, Aqua-Sol grinding compound and Zeta-Sol Machining and retooling compound.

WAYNE CHEMICAL PRODUCTS CO.

9446 Capwell Ave.,

Detroit, Michigan



STANDARDIZE ON PADDOCKS

The Ball Bearing Frictionless Support

BUILT IN

PADDOCK BAND SAW GUIDES

Has Stood The Test For Years

Where Increased Production and Fine Work Is Wanted

PADDOCK GUIDES SHOULD BE USED

Easily Adjusted To Width and Thickness Of The Blade

TRIAL ORDERS ARE SOLICITED

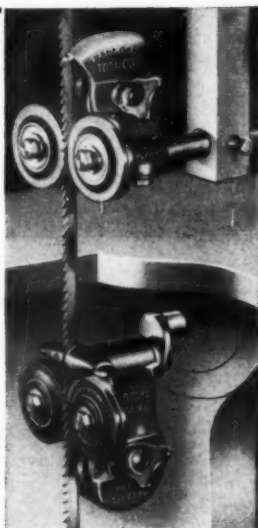
Write for information.

PADDOCK TOOL COMPANY

Guide Makers Since 1920

1418 Walnut St.,

Kansas City, Mo.



**BENDING
BRAKES**

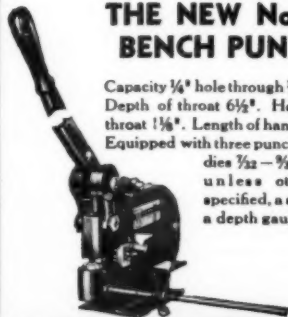
WHITNEY-JENSEN

**METAL
TOOLS**

TOOLS YOU NEED TODAY

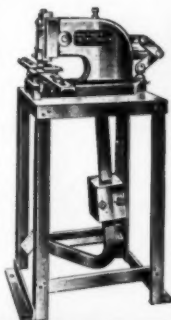
THE NEW No. 17 BENCH PUNCH

Capacity $\frac{1}{4}$ " hole through $\frac{1}{4}$ " iron. Depth of throat $6\frac{1}{2}$ ". Height of throat $1\frac{1}{4}$ ". Length of handle 22". Equipped with three punches and dies $\frac{7}{32}$ - $\frac{9}{32}$ - $1\frac{1}{32}$ unless otherwise specified, a side and a depth gauge.



No. 28 and 29 FOOT PRESSES

For fast, semi-production punching operations. Capacity 2" hole in 16 gauge. Can punch 100 pieces per minute. Sturdy and powerful. Works with an easy push of one foot. No. 28 has a 7" throat depth. No. 29 has a 10" throat depth.



Write for New No. 14 Catalog.



WHITNEY METAL TOOL COMPANY
115 FORBES ST., ROCKFORD, ILLINOIS

tools should be made up and sent to the manufacturer to be hardened.

Photographing on Metal

An Eastern manufacturer announces a new process which permits the printing of photographs on metal. By this process, copies can be made by the usual contact printing method; or with an enlarger from an ordinary drawing, regular print or negative. Aluminum

sheet is used as a base. The usual distortion, due to unequal expansion and contraction, often present in sensitized film, paper, or tracing cloth, is overcome.

No special treatment, or expensive equipment is necessary in processing. The manufacturer recommends the usual steps of development and fixation followed in processing ordinary film, using standard developers and fixatives. Because of its slow speed, this metal has an additional advantage for industry in that no special darkroom is required.

Among the various uses to which it can be applied are exact-to-scale copies of drawings and photographic plates, copies of instruction sheets and special name plates. It is also well adapted for templates of all sizes, and for making permanent records, as it will withstand high temperatures, and can be made moistureproof. It will withstand rough usage in shop or field without tearing or obliteration of dimensions.

**Special Anti-Mushrooming
Anti-Chipping Heat-treat**

Overize Shanks ▶

Exclusive

Knurled Back ▶

Exclusive

Thumb Grip ▶

Broach-

Rounded ▶

Corners



**and
a
complete
line of
Marking
Devices**

*Write for Price and
data Bulletin No. 113-12A*

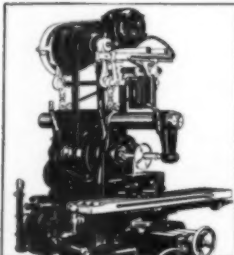
**NEW METHOD STEEL
STAMPS, Inc.**

149 Joseph Campau, Detroit

All-Electric Adjustable-Speed Drives

All - electric a.c. adjustable - speed drives in sizes which will extend this simple method of control to larger applications, particularly in the machine tool field are now available. Three additional units of 20, 25, and 30 h.p. are announced.

The same principle of speed control is used as in the other sizes previously offered, which range from 1 h.p. upward. For the sake of compactness, the larger sizes are mounted horizontally. Particular attention has been given to

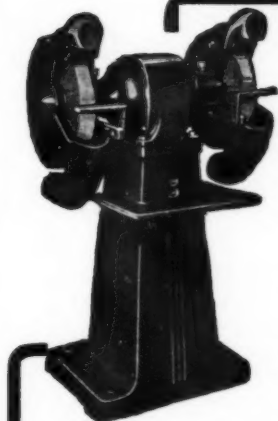


Your Motors — Our Drives

Team them up! Make an important initial money saving in converting your present belt-driven machine tools into direct drive units. Only the Remco Motor Drive is scientifically designed to take any motor of reasonable size—new, or USED. Only drive on which the motor may be switched instantly in case of a "burn-out". Investigate — write! Remco Products Corp., State St. at R.R., York, Pa.

REMCO MOTOR DRIVES

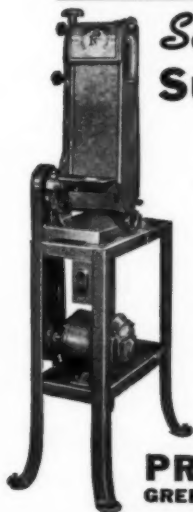
for LATHES, SHAPERS, DRILLS, MILLING MACHINES, etc.



Investigate
"B-LINE"
HEAVY DUTY BALL BEARING
GRINDERS

Available in BOTH Pedestal and Bench Models, from $\frac{1}{4}$ to 5 H.P. . . . These Grinders are designed for High Capacity output, and strongly built for Hard Service . . . Patented 6 Volt Bayonet Type Lamps that vibration will not work loose, combined with Spark Arresters over each Wheel . . . Adjustable Tool Rests, and Safety Glass Eye-Shields . . . meet all Safety Code Requirements . . . Furnished with either Magnetic or Manual Type Off-and-On Switches . . . Send for Informative Bulletin No. 1003 Today.

THE BROWN-BROCKMEYER CO., Inc.
Leading Independent Motor Manufacturers — DAYTON, OHIO

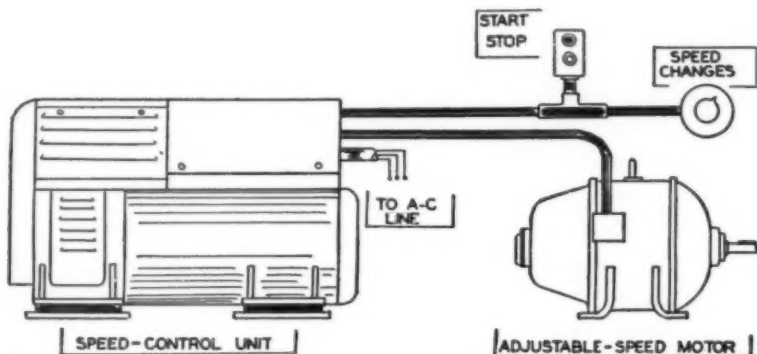


Save Time Burring
Surfacing and Polishing

Adjustable from vertical to horizontal position within a few seconds, the No. 608 Production Abrasive Belt Surfer is capable of large output. It saves time burring, surfacing and polishing plastic moulded products, rubber, wood, pressed steel parts, die castings, iron, steel, etc. Ball bearing equipped throughout. Work or belt table is 15"x6". Abrasive belt is 50" long x 6" wide. Work gauge is adjustable to any angle and removable. Other sizes 4" to 20" width of belt. Vertical and Horizontal. Also Reed High Speed Sensitive Drills.

Send for bulletin TODAY.

PRODUCTION MACHINE CO.
GREENFIELD MASSACHUSETTS



the design of the mounting brackets which contain special longitudinal rubber shock pads for quiet operation. No special foundation or levelling is required.

Three wires from the 3-phase, 60-cycle, a.c. power source (which may be 220, 440, or 550 volts) are connected to the control unit exactly as would be

done with any motor and control. From the control unit, secondary circuits are run to the other three elements of the "drive" namely the driving motor, speed adjuster, and start-stop push button station. Both the speed adjuster, which is no larger than an ordinary plate rheostat, and the buttons for starting and stopping the driving motor, can be located where convenient.

The driving motor is designed particularly for adjustable-speed service. It can be supplied in a variety of types, including enclosed fan-cooled, splash-proof and explosion-proof. Gearmotors may also be used. Connection to the driven machine is by any one of the methods regularly used for direct motor drives. Considerable space is saved because no intermediate devices are required for the speed changing.

The motor can be started and stopped without interfering with the speed set-



Have you our Engineering Data Sheets on the new line of

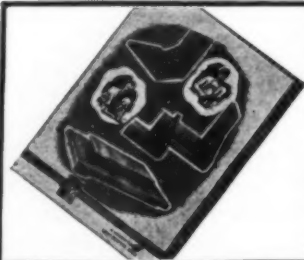
BABY GUSHER

Machine Tool Coolant Pumps?

Made in four types; 1/30 and 1/10 h. p. for small machine tools and machines requiring from 4 to 10 G. P. M.

Write for descriptive literature.

The Ruthman Machinery Co.
203 Pike St., Cincinnati, Ohio



HAVE YOU CONSIDERED

MILLIKEN Angle irons, bench and surface plates?

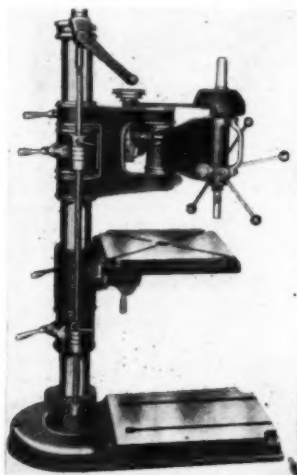
Who else can offer all these advantages?

1. **MILLILOY**—A new semi-steel material—minimum warpage—four times the wear.
2. A choice of three types of finish.
3. A wide variety of sizes.
4. An industrial standard for 30 years.
5. Delivery out of stock.

Write for our latest folder. It contains an authoritative and interesting story on the newest improvements in these basic production tools.

MILLIKEN MACHINE COMPANY

23 Prospect Place, West Newton, Mass.



MAKE YOUR DRILLING JOBS EASIER

**Increase Profits . . . Speed-up Production
End Worker Fatigue . . . Increase Efficiency**

by using this

DRILLMASTER RADIAL DRILL

Economical in operating and first cost, this floor type, heavy duty, precision-made, well-balanced Radial offers many features that merit your careful consideration. Drilling to the center of a 36" circle, No. 2 Morse Taper and heavy duty $\frac{1}{2}$ HP ball bearing motor. The full floating, ball bearing spindle assures free and sensitive operation at all speeds.

Send TODAY for bulletin giving full details.

Wm. C. Johnson & Sons Machinery Company
St. Louis, Missouri

A CLAMP for Every Purpose



**Forged Steel
Quick Acting
Deep Reach
Welders**

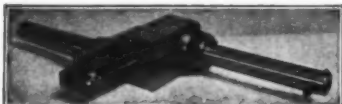


Sizes Available:
 $\frac{3}{4}$ " to 10' opening
 $\frac{1}{2}$ " to 16" deep

Write for CATALOG and PRICES on Clamps for all purposes as well as many other tools for use in the Machine Shop.

IN STOCK AT YOUR SUPPLY HOUSE

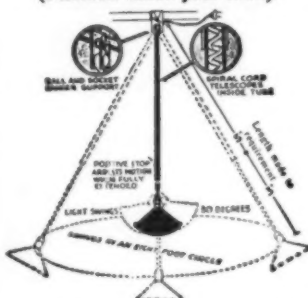
The Cincinnati Tool Co., 1945 WAVERLY AVE.,
CINCINNATI, OHIO



MODERNIZE present equipment with a **RUSSELL BORING BAR**. Bores 9/16" to 12" dia. with boring axis parallel to shank axis. One compact tool, with micrometer adjustment.

RUSSELL BORING BAR CO.
MIDDLETOWN, OHIO

Light—Universal Movable Stays Put best for machine shop and drafting room and avoid glare or head strain. (Fastened above your work).



Push it up, pull it down, swing it out, swing it around, it stays put.

Write for Literature.

J. Zabora Machine & Gear Co.
1321 S. Mint Street, Charlotte, N. C.

ting. Moreover, the speed can be changed while the motor is in operation. Quick stopping is obtained by regenerative braking. No clutches of any description are needed since ample torque with controlled acceleration has been provided for all starting conditions.

Regardless of size, all of these adjustable-speed drives not only make very slow speeds available for such operations as threading material or setting-up work, but provide an almost infinite number of speed variations within an over-all speed range of 16 to 1 for continuous 24-hour duty. An even greater range is possible where the service required is intermittent.

Some Welding Aid

An Ohio Company announces three items of general interest to welders. One is an improved formula for their non-spatter fluid. The new product is said to reduce adhesion of weld rod spatter to the work pieces, reducing cleaning time. This compound serves as a good base coat for subsequently applied paints or lacquers. Also available is a water soluble spatter preventive which is especially recommended for use with metal left unpainted, such as stainless steel, aluminum, monel, etc.

The same manufacturer offers an addition to its line of aluminum arc welding electrodes. The new unit is suitable for welding on 2-S aluminum where the deposit and parent metal are to be anodized. It is said to provide a good color match.



The "BABY GIANT" VANDERBEEK Universal Joints

are obtainable in two sizes—the "Baby Giant" for instrument and control work; and the "Giant", with hardened and ground working surfaces for heavy duty work.

Send us your requirements — We'll send you prices.

AMERICAN TOOL WORKS, INC.
26 FRANCIS AVE. HARTFORD, CONN.



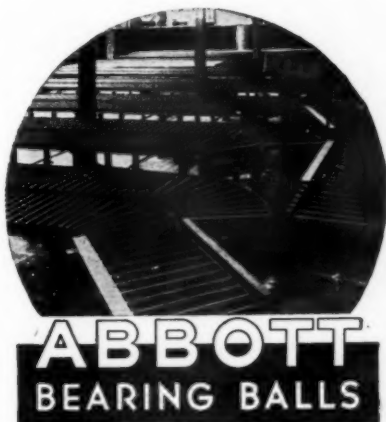
Advertising

Many industrial companies are increasing their advertising budgets materially for 1941. All indications point to at least a maintenance of such increases during the national defense emergency. Members of the Exhibitors Advisory Council and the Association of Exhibit Managers came to this conclusion recently in Cleveland following the close of their one-day meeting and discussion of advertising for the coming year. Trade and business papers and industrial shows will be the primary beneficiaries of these increases.

It is felt by this committee "that with the stress of national defense activities, many replacements permitting present machines to fill other needs will result in greatly increased turnovers by companies manufacturing and distributing those parts."

The committee's statement further pointed to the importance of maintaining each company's position through advertising in its various forms, stressing the necessity of looking ahead to the time "when peace returns." Far-sighted manufacturers who are now deluged with orders are anticipating the day when conditions will have changed and are investing liberally

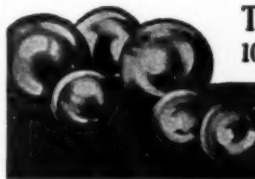
**Carry
the
Load
with
safety
on**



**ABBOTT
BEARING BALLS**

Typical among industrial applications is this Standard Conveyor Company installation in an oil refinery. In the rolls of these storage and transfer lines, Abbott steel balls assure easy-running bearings and unfailing service.

Can Abbott offer plus advantages in your bearings? Let's get the proof from a trial assembly. Tell us size and tolerance, and we shall gladly send samples for any inspections and tests you want to make.



The Abbott Ball Company
1043 New Britain Ave., Hartford, Conn.

*Unseen in use
yet always on the job*

now in advertising. One company, for example, indicated at the meeting that its budget is up 45% over that of 1940. Trade papers figured largely in this increased appropriation.

The committee also referred to a recent statement by business editors in regard to research. It was pointed out that research carried on at present, will help provide new products to serve new needs when the stress of national defense has lessened.

SEVERANCE Cutters for Every Need



Severance offers the largest variety of shapes and sizes—carries the greatest stocks and can give the quickest deliveries—reproducing any known shape of Rotary File with a Ground from the Solid Cutter on short notice.

Shown here are only a few of the many styles and sizes. We also make special cutters to your specifications.

Write for our Catalogues showing our complete line of cutters.

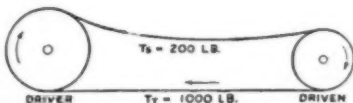
SEVERANCE TOOL MFG. CO.
1510 GENESEE ST. - SAGINAW, MICH.

"Effective Pull"

By W. F. Schaphorst

The sketch shows a common horizontal belt drive in which there is a pull of 1000 pounds on the tight side, and 200 pounds on the slack side.

The so-called "effective pull" is the tension on the slack side subtracted from the tension on the tight side, or, 1000 lbs. minus 200 lbs., which is equal to 800 pounds.



It is plain that if the pull were 1000 pounds on both sides, no power would be transmitted because the drive would then be in "perfect balance": 1000—1000 equals 0. In other words, there must be a "difference" in tension. If there is no difference there will be no motion, and without motion, power transmission is impossible. The "difference" is what is commonly termed "effective pull."

Now, knowing the effective pull, it becomes easy to determine the power transmitted by the belt. This is the rule: Multiply the effective pull in pounds by the velocity of the belt in feet per minute and divide by 33,000. The result is the horse power transmitted.

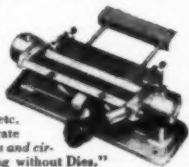
NO DIES FOR SMALL QUANTITIES

"Micro" Die Substitute Machines save die costs and time on small lots. One machine is

"Micro" Bench Brake

Creates non-stock sized angles, channels, Vees, etc. Folding width 6". Accurate to .001". Write for prices and circular "Metal Duplicating without Dies."

O'NEIL-IRWIN MFG. CO.
314 - 8th Ave. So. Minneapolis, Minn.



ERRINGTON MECHANICAL LABORATORY

MAIN OFFICE AND WORKS: STATEN ISLAND, NEW YORK

Chicago Office:
6422 N. RICHMOND STREET

New York Office:
200 BROADWAY

Boston Office:
830 OLD SOUTH BLDG.

CLUTCH OR CONE DRIVE

*Our High Speed Tappers
are Super-Sensitive for
Small Tapping*



*All
Styles
and
Sizes—
0 to 2"
Taps*

*Style B
Positive
Adjustable
stop holds
work down*

*Style C Graduated
Adjustable Safety
Friction*

Style D-E, Quick Change Tools



MORE PROFIT

Speeding up production . . . faster and more flexible operation . . . quicker, easier control . . . these are just some of the things you gain with Schultes 4-Speed Motorizing Equipment . . . and they all spell MORE PROFIT.

A Schultes unit will mean Finger-Tip Control on your punch press, lathe, milling machine, shaper, drill press, etc. Instant selection of just the right speed for the job . . . dependable, economical and durable units that are easily applied to all your machine tools.

Write for bulletin giving full details.

Westlof Tool & Die Co.
428 Bellevue Ave., **Detroit**



SAVE Labor and Time

Eliminate heavy lifting. Cut handling costs. Table

swivels and locks in any position. Can be varied $15\frac{1}{2}^{\circ}$ by slight foot pressure, leaving operator's hands free. Engineered and built by tool engineers, experienced in production of special machines, dies, jigs and fixtures for exacting requirements.

Send **TODAY** for illustrated catalog No. 2.

MIDWEST TOOL & ENG. CO.
112 Webster St., Dayton, Ohio

INSIST ON THE GENUINE

Abrasive
RED BAND
**DIAMOND
TOOLS**

Look for the **RED BAND**
of Proved Performance!

Write for newest price list and literature.

ABRASIVE DRESSING TOOL CO.
1550 BROADWAY DETROIT

When making estimates for single belts, engineers generally allow roughly, 35 lbs. per in. of width, and 50 lbs. for double belts. 70 lbs. per in. of width is commonly allowed for the tension on the tight side for single belts and 110 lbs. for double belts.

Engine Efficiency

By W. F. Schaphorst

Count the explosions of an internal combustion engine, and by a little simple figuring, it is possible to approximate the efficiency of any engine of the hit-and-miss type of governing.

Subtract the number of explosions per minute made by the engine when it is pulling no load at all, from the number of explosions per minute when pulling full load. Then divide the remainder by the number of explosions per minute when pulling full load, and the quotient is the so-called "mechanical efficiency".

For an engine that fires 95 times per minute when pulling full load, and 24 times per minute when pulling no load at all, the difference is 71. In other words, 71 of the explosions are utilized when pulling full load, whereas 24 of them are lost in overcoming the internal friction in the engine.

Going back to the rule, divide 71 by 95 and the quotient tells us that the mechanical efficiency of the engine is a bit less than 75% a rather low efficiency. It should be bettered, and it can be bettered by reducing to a minimum, the number of explosions per minute when running unloaded.



For Machine and Tool Work & Quick Set-Ups

The only 3-way reading precision indicator. Accurate in either direction. Feeler mounted in centered cone bearings. .014 reading. New improvements.

Price \$5.00

Write for folder.

J. R. Reich Manufacturing Co.
45 E. Stroop Rd., Dayton, Ohio



BAUMBACH

STANDARDIZED

Machined Steel **DIE SETS** Semi-Steel

Drop Forged Steel

Headquarters for Standardized Die Sets, embodying many exclusive features and embracing more than 195,000 stock sizes and 46 different styles. A die service that is unsurpassed. Let us prove it!

Send for our new 336 Page Catalog.

E. A. BAUMBACH MFG. CO.
1810 So. Kilbourne Ave., CHICAGO, ILL.



100%

Adjustable

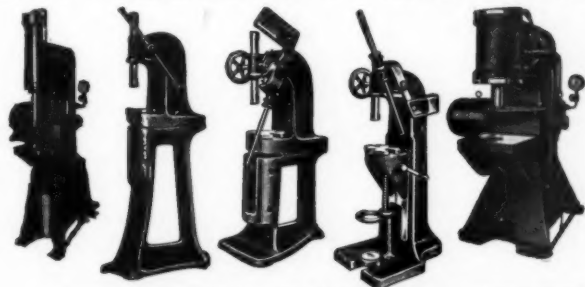
SHOP SPOTLIGHTS

Price \$3.50 in single lots
\$2.25 in lots of six
F.O.B. Chicago

CATALOG FURNISHED ON REQUEST

CHICAGO DIE CASTING MFG. CO.
2502 W. Monroe St. CHICAGO, ILL.

For AIRCRAFT and MUNITIONS



1883
GREENERD
The Originators
of the
Arbor Press
1941

PRECISION WORK IN REARMAMENT

65 Standard Styles and Sizes. Manually operated presses $\frac{1}{4}$ to 35 tons pressure. Motor driven hydraulic presses $1\frac{1}{2}$ to 30 tons pressure.

Let us send you our catalog No. F.

GREENERD ARBOR PRESSES

NASHUA

Est. 1883

NEW HAMPSHIRE

It is sometimes difficult to attain a mechanical efficiency of 90% in an engine of this type although 90% is common in steam engines because steam engines are easier to lubricate and the heat problems encountered are not so complex.

Reduction of explosions at no load simultaneously increases the power of the engine, without consuming more fuel. If the number could be cut down from 24 to 10, we would have 14 "useful" explosions to add to the 71, which gives 85 useful explosions. Or, divid-

ing 85 by 95 we now have a mechanical efficiency of 89.5%. In other words, the efficiency has been increased from 75% to 89.5% or 14.5%.

South Bend Issues New Lathe Catalog

The South Bend Lathe Works, 766 E. Madison St., South Bend, Ind., announce a new general catalog which is said to be one of the most complete lathe catalogs ever published. The catalog has 112 pages and contains over 240 illustrations. It shows 50 different sizes and types of South Bend Back-Geared, Screw Cutting Lathes for manufacturing, tool room and general shop work.

Sizes of lathes illustrated are 9", 10", 13", 14½", 16" and 16-24" swing. Each size is shown in several different models with motor drive and countershaft drive, in quick change gear and standard change gear. New items shown include the Model "A" 9" Workshop Tool Room Lathe; the 10" Swing 11/16" Collet Series "S" Lathes; and the 10" Swing 1" Collet Lathes.

BURR KEYSEATERS



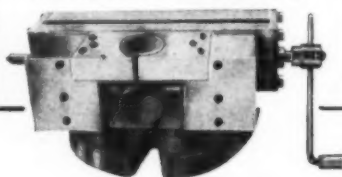
Mill keyways in the run or on the ends of shafting already erected—save money on alteration, erection, and repair work.

Made in 4 sizes, for hand or motor operation.

Write for Bulletins and prices.

JOHN T. BURR & SON
429 Kent Ave., Brooklyn, N. Y.

MACHINING SPECIAL FITTINGS



You do most of your Drilling and Tapping operations better and at less tooling cost with the

"JOHNS" DRILL JIGS

Write for information

HEUSER MFG. CO.

1638 N. Paulina St.,

Chicago, Ill.

Bulletin on Dial Bore Gages

Standard Dial Bore Gages are described in a folder offered by the Standard Gage Co., Inc., Poughkeepsie, N. Y. The principle of operation of these dial gages is clearly indicated. Complete specifications are given along with illustrations of the various types available. Also included are several photos showing the use of the gages in an airplane engine plant.

TRICO OILERS

SAVE TIME—OIL—WORRY



No guesswork—bearing failures—waste—idle machine time—oil-soaked motor windings—fire and accident hazards, when you modernize with TRICO OILERS. There's a type for every application.

WRITE FOR BULLETINS.

TRICO FUSE MFG. CO. Milwaukee Wisconsin

Chronoscope

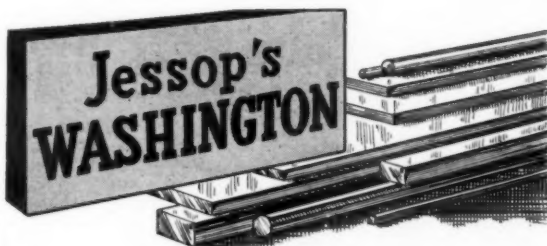
Split seconds that are "ages" to a bullet or camera shutter, are said to be measured as easily as a wrist watch measures the time of day with a new device called a chronoscope, developed by the Research Division of Remington Arms Co.

The device, built into a small portable cabinet, splits the second 1000 - ways, and will measure from one up to 200 of these milliseconds with less than a 1% error.

Already it has been useful in studying the effect of velocity and flight time of bullets on accuracy, range, trajectory and hitting power, but its use is not confined to ballistics. Many important operations in science and industry are performed in less time than the flick of an eyelash. Any of these can be clocked with the chronoscope providing an electrical impulse can be obtained at the beginning and end of the event.

The maximum swing of an indicating needle across a scale tells the operator precisely how long it takes a fuse to blow, a flash bulb to light-up, a relay switch to snap or a blasting cap to explode.

Projectile velocities can be measured over distances as short as 5 or 10 feet. "Remaining velocity" can be measured after the projectile has traveled some



A name FAMOUS among Straight Carbon Tool Steels

For forty years Jessop Steel Company has supplied their highest quality Straight Carbon Tool Steel to the trade under the brand name "WASHINGTON". So dependable has been its performance during these years that WASHINGTON has become a leading favorite for carbon tool steel applications.

Typical Applications

Cold Striking Dies,
Threading Dies,
Blanking Dies and
Punches, Cold
Forming Dies,
Knives, Razors,
Shear Blades, Wood
Chisels, Drills, Taps,
Reamers, etc.

If you have a die application requiring a hard outer surface with a tough core, or a tool application where the edge must be sharpened to a high degree of keenness—try Jessop's WASHINGTON Carbon Tool Steel. You can depend upon its uniformity. Standard sizes and tempers—in bars, plates, sheets, strips, and forgings—are carried in stock. Write JESSOP STEEL COMPANY, 603 Green St., Washington, Pa., for quotations.



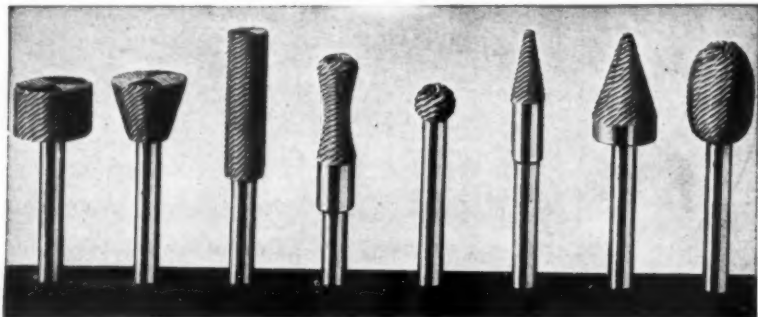
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CARBON · HIGH SPEED · SPECIAL ALLOY ·
STAINLESS · and · COMPOSITE STEELS

distance.

The instrument indicates the time interval from a quantity of electricity that passes through a specially designed galvanometer while the measured event is taking place. The galvanometer resembles a conventional portable indicating electric meter.

A vacuum tube switching circuit starts the current at the beginning of the interval, and stops it at the end. A photo electric cell can be used to obtain the start and stop impulses.

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**Luers Patented Design Provides Built-In
SIDE CLEARANCE, BACK CLEARANCE
and FREE CHIP EXPANSION**

Here's a cutting-off tool that eliminates 90% of your cutting-off troubles, because

The T-shaped blade prevents excessive side friction—

The tapered blade guarantees adequate back clearance throughout the blade.

The concave top curls the chip, which is free to expand without binding.

The result—finer, aircraft finish, greater production, fewer plates used. Besides these features, you save grinding time, for the blade requires sharpening on the front face only.

You save removing and inserting time. You save time in resetting in relationship to other tools and the work.

In addition to the blade holder illustrated, holders are available for machines of all types.



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Tell us the make and size of your equipment. Our engineers will send you the information you require to speed up production and lower your cutting-off costs.

EMPIRE TOOL CO.

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DETROIT, MICHIGAN

New Trends and Developments

Giant Machine Tool Goes to Work

ONE of the largest boring mills in the world recently went to work to speed up production of large water-wheel generators and other power equipment required under the national defense program. The new mill is capable of cutting 14 miles of shavings from a 500 ton piece of steel per hour; supports its work pieces on an 88 ton turntable, and despite its mass of 350 tons, has a normal accuracy of four thousandths of an inch.

In discussing the new machine, it was pointed out that its normal accuracy of four thousandths of an inch can be

increased by controlling temperature conditions to prevent contraction and expansion. Might of the machine is matched by that of its foundation, which required the excavation of 1300 cubic yards of dirt to create a pit 50 feet wide, 60 feet long, and 12 feet deep. One hundred and twenty steel piles, filled with concrete, were driven to an average depth of 29 feet. Each can support 30 tons. The foundation proper required 350 yards of concrete and more than a mile of reinforcing bar.

The machine's 30 foot steel turntable has a maximum speed of 5-½ turns per minute, and the machine will have a



possible cutting speed of 10 feet per second. Thirty four electric motors drive the mill. Largest are the two 300 h.p. units driving the table; smallest are the two $\frac{1}{2}$ h.p. midgits which "float" the table by pumping lubricating oil into the grooves between the table and its circular track.

Though normally the table will carry

pieces up to only 40 feet in diameter, it is possible to adjust the machine for work on much larger work. The new mill supplements existing 28 foot, and two 20 foot mills, plus a special floor mill set-up, used to machine the 55 foot bearing for the Mt. Palomar telescope and the Boulder Dam Gates.

(Photo—Courtesy Westinghouse)

High Production Gear Lapping

Aircraft engine gears are now being lapped on a new type highly flexible two - lap lapping machine. Shown here in the plant of a well-known aircraft engine producer, the lapper is automatic in operation, and in spite of its high flexibility to accommodate a wide variety of sizes and types of gears, is designed for high production lapping of moderate and small size gears.

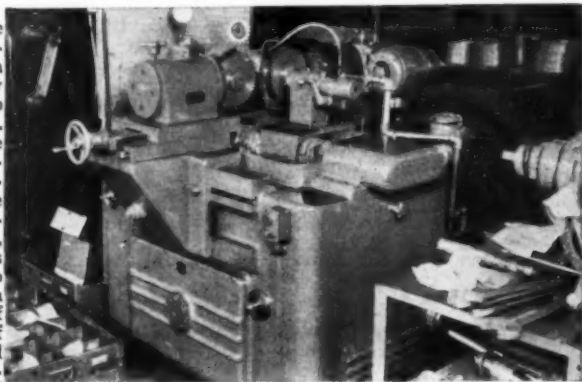
The machine operates on the well-known crossed-axis principle. Operating features of the machine include a relatively low surface speed of rotation and high speed of reciprocation of the laps across the faces. The latter may be adjusted from 90 to 300 reciprocations a minute.

Change gears permit ready adjustment of the lap spindle speed from 52 to 283 r.p.m. A third adjustment provides selection of desired reciprocating stroke length.

At the end of the lapping cycle, one head and lap retracts, permitting ready unloading and reloading of the machine. The arrangement is such that when the retracted head returns, its lap will always be in mesh with the gear to be lapped.

Improved Goggle Lenses

A Midwestern manufacturer announces a new lens material for safety



goggles. This new product is said to be the result of persistent research. One of the most interesting of the tests employed a tempered glass lens in one eye-frame and a new type lens in the other in a flash welding service test.

According to the manufacturer, flying particles of hot metal and sparks imbedded themselves in the glass lens but made no impression on the new type lens. It is also asserted that even molten metal, splashed on the lenses, had no effect on their surfaces. The shock resistance of the lenses is said to be several times that demanded by A. S. A. and U. S. Bureau of Standards requirements.

This new material should bring greater "goggle comfort," for its weight is said to be 45% that of tempered glass. Lenses are available in curved or flat styles, for safety goggles and spectacles of any style or shape.

Research

Many contributions by research laboratories earned the spotlight during last year. Some of these are summarized by Guy Bartlett in a release by G. E.

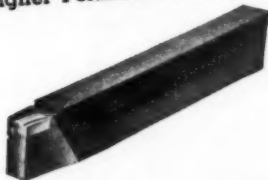
The highlights included glass bushings that can be welded to metal, producing hermetic seals; alloys of new compositions for new jobs and new maximum temperatures; further mastery of lightning as a result of new equipment for recording in more detail, the story of what happens in an infinitesimal fraction of a second; high voltage X-ray equipment of unusual design for unusual purposes; and the production of "U - 235," an isotope of uranium with enormous though remote possibilities as a source of power.

The means of producing hermetic seals between glass and metal gives promise of eliminating gasket material in some electrical equipment. These metal inserts are incorporated during the casting of the glass. They make vacuum-tight seals and the outer edges of the inserts may be soldered or welded to the metal cases. The glass was No. 522 in a long series tested. It has low thermal expansion, high electric resistance and good weathering properties.

YOU GET THESE *Extra Values* in KENAMETAL Steel Cutting CARBIDE TOOLS

At no greater cost!

- 50% Greater Break Strength
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- 2/3 Higher Permissible Feeds



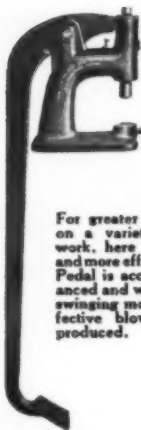
- 2 to 5 Times Longer Life Between Tool Grinds
- More Efficient Tool Angles

Despite these definite advantages, KENAMETAL costs no more than ordinary carbide tools. Write for latest catalog and price list.

 **McKENNA METALS Co.**
135 LLOYD AVENUE
LATROBE, PENNSYLVANIA, U.S.A.

The increasing use of metals at elevated temperatures, as in mercury boilers and turbines encouraged research in the field of alloy systems having finely dispersed phases of great stability. Creep and rupture data on some of these showed increased stability under stress over steels now in general use. Columbium, a rather unfamiliar element, was found to produce an alloy of exceptional properties when added to iron.

Rapid Production of Small Parts Nilson Foot and Power Presses



For greater production on a variety of light work, here is a lighter and more efficient press. Pedal is accurately balanced and with an easy swinging motion, an effective blow is easily produced.



These Presses are designed for rapid production of small parts. The operator is relieved of actual labor and his work is merely control of a semi-automatic machine.

Safety clutch is provided which absolutely prevents repeating, regardless of whether or not the treadle is released. By turning a handle the press is instantly converted into a continuously running machine.

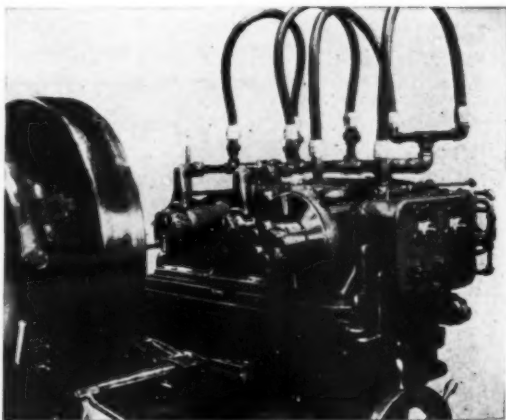
Our No. B O Foot Press and No. B 2 Power Press are shown. We also manufacture a No. B 3 Power Press which is larger and more powerful. Our Power Presses can be equipped with toggle feed, dial feed, or wire straightener and former.

Let us send you complete details.

The **A. H. NILSON** *Machine Co.*
BRIDGEPORT, CONN., U.S.A.

Recessing, Boring, and Tapping

A new Recessing, Boring, and Tapping Machine has been designed to completely machine the internal or tapped end of integral joint type casing at one chucking. It is similar in design to the Mill type Recessing Chaser Pipe Threading and Cutting Off Machine. The conventional carriage and recessing chaser pipe threading die head were replaced with a special carriage on which are mounted the recessing, boring and tapping tools. In effecting this arrangement, three tool slides are mounted on a cross slide which can be indexed to



Join The Chain Making Gang Nilson Chain Making Machines

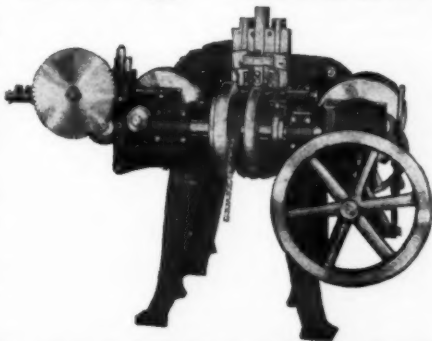
To make a full line of standard size chains as known to the trade, Nilson makes the four necessary sizes of machines. The chains made by these machines are strong, durable, safe and flexible.

The most important feature of the chains made by these machines is that ends are tucked in, making them perfectly smooth on both sides, and increasing the tensile strength 20%.

These chains are smooth to handle and will run through the heads without injury. They will run accurately on sprockets for conveyors or power transmission purposes.

We also make machines for forming the straight welded chain, for twisting the chain, and for forming the cross chain and hook.

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The **A. H. NILSON** *Machine Co.*
BRIDGEPORT, CONN., U.S.A.

bring any one of the tool slides into working position. One tool slide finishes the recess, faces the end of the casing, and chamfers three surfaces in the end of the casing.

The second tool slide finishes the taper bore preparatory to tapping, using a receding action to the cutters for accurately producing the taper. A tool of a design similar to the Receding Chaser Collapsible Tap is employed for the boring operation. Upon completion of the boring operation the cutters are collapsed to permit withdrawing of the tools.

The third tool slide is a special Receding Chaser Collapsible Tap arranged to chase the internal threads, using a leadscrew mechanism.

All movements of tool slides as well as the cross slide are hydraulically controlled with the circuits arranged with interlocks to assure correct operating sequences. The cross slide is hydraulically locked into position on the carriage when any one of the tool slides is

in action. The operating controls for this hydraulic cycle are conveniently centralized on a panel at front of machine, providing the operator full control from a position permitting observation of the tools in action during machining cycle.

The casing to be machined is positioned in spindle against the arm of the pneumatically operated work stop and is then gripped by the front and rear pneumatic chucks. The recess tool slide advances rapidly towards casing and is automatically brought to a predetermined rate of feed just before tools enter work. At completion of the recessing, chamfering, and facing operation, the recessing tool slide is rapidly retracted and the cross slide is then indexed against the mid-position stop, bringing the boring tool slide into working position.

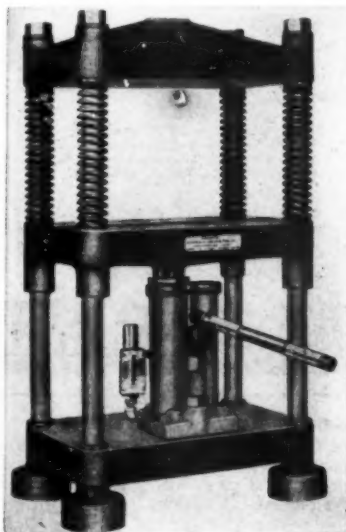
The boring tool slides are rapidly advanced towards work and are automatically reduced to a predetermined rate of feed as tools enter cut. At end

of the cut, the tools collapse and the tool slide is rapidly retracted from end of the casing. The boring tools automatically reset from their collapsed position at the end of the return stroke to be ready for subsequent boring operations. The cross slide is then moved against a third stop which brings the Receding Chaser Collapsible Tap into operating position.

New Hydraulic Presses

Two new hand - operated hydraulic presses are announced by a West Coast

manufacturer. Offered in 15 and 20 ton models, they are said to be sensitive, flexible, and powerful. They are especially designed for shearing in of punches or dies, small run blanking and forming jobs, testing materials, and for many other uses.



The stroke can be controlled by stop collars furnished as standard equipment, giving an infinite range from zero to maximum. Hydraulic unit automatically cuts out when reaching maximum load, guarding against injury to

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MODERN TOOL SHOP
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New ELKONITE TIP pencil.
New Baby Grand Model at a
lower price.

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in use

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42 Church St.,

New York, N. Y.

press or mechanism by overloading.

The base and crown platens are made of cast steel. Center platen has a "T" slot for clamping work.

The 15 ton press has platens 12"x18". Distance between columns is 8¼" x 14¼". Twenty ton press has platens 18" x 24". Between posts: 14" x 20".

Cellophane Bags Expedite Assembly

Turret lathes, now in unprecedented demand for rearmament work, are said to come down the assembly line just a little smoother and faster because of cellophane bags. All smaller parts are tagged with a part number in the stock room, then loaded into the bags. This keeps them intact, yet fully visible and simplifies parts order check-ups.

Since there are between 5,000 and 9,000 individual parts in a turret lathe, a good job of housekeeping and of control is needed to assure delivery to the assembly floor of all the parts when called for. This system has been in effect nearly a year and according to reports is working out very satisfactorily.



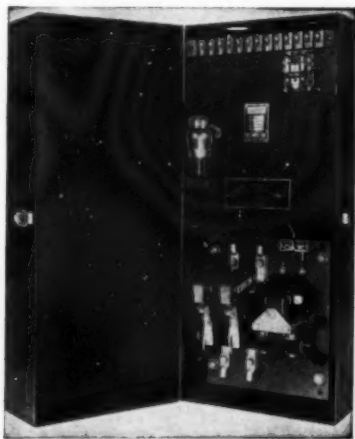
For Better Welds

To eliminate the skill required in timing manually timed welds and assure uniformity of welds, a new weld Timer-Contactor to be used with any 15 to 35 KVA., manually timed spot welder is announced.

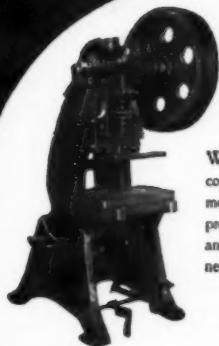
Available for 220, 440 or 550 welding voltages and for 25, 40, 50 or 60 cycles frequency, the new unit is adjustable over a range of timing of from 2 to 30 cycles. Two control knobs provide for close adjustment to suit the work being welded.

Long life and low maintenance costs are claimed for the new weld "controller." A specially designed high-speed, heavy duty welding contactor is employed. The contacts of both contactor and relay are quickly removable for replacement and the entire unit can be serviced without specially skilled help. A feature of the new unit—a simplified wiring diagram—permits it to be quickly installed by any electrician.

The entire unit consists of an electronic tube, relay and magnetic contactor enclosed in a compact spring hinge cover case, which measures approximately 11" x 13" x 30".



RECLINABLE POWER PRESSES



We manufacture a complete line of mechanical power presses, with sizes and types for every need in your shop.

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Newark, New Jersey

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TORNADO Portable Industrial Vacuum Cleaner

Powerful—
46½" waterlift

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Weight 40 lbs.

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The exclusive solid steel slide makes Simplex Vises stronger and more serviceable.



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Canadian Desmond-Stephan Mfg. Co., Ltd.—Hamilton, Ont.

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ATTENTION Plant Managers and Superintendents

Uncle Sam's defense program has made most of us realize the need for increased production in the machine shop. The basic and best way to stop loss of time, power and production in the average machine shop is to **eliminate the line shaft**. This can be done quickly and cheaply at great savings in time and money with Individual Modern Motor Drives for all types of machinery.

Individual Modern Motor Drives effect a substantial saving in the cost of machine operation and at the same time make it possible for you to get practically the same production out of your old machines as you would get with new machinery.

Modern Drives create a flexible condition in the machine shop so that when the type of work changes the machinery can be rearranged quickly and at the least expense.

Get in step with faster, better and cheaper production in your plant.

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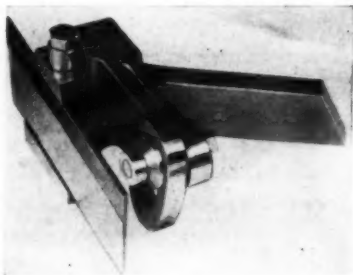
Address your inquiries regarding Individual Modern Motor Drives to

Quality Hardware & Machine Corp.
5831 Ravenswood Ave., Chicago, Ill.

The second development is described as the first 50 foot candle RLM continuous fluorescent lighting for general illumination. Continuous row lighting is new—efficient and modern. The "50 Foot Candler" is said to bring it to still greater efficiency and usefulness with the light intensity recommended by lighting authorities for good seeing conditions. This unit available in either single or double length wiring channels for two or three 40-watt lamps.

Cutting-Off Tool for Lathes

A new cutting-off tool is announced by a Southwestern manufacturer. This patented tool is said to make cutting-off in a lathe fast and convenient. The diameter of stock that can be cut is limited primarily by the swing of the lathe. Standard sizes offered cover diameters ranging from 4" to 10".

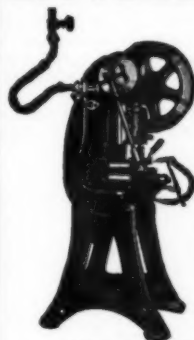


The tool is intended for cutting off large diameter stock, using heavy feeds, but the manufacturer declares that it is equally efficient in cutting small stock. It features a supported blade and a safety slip. The wide blade support permits use of narrow cutting blades 3/32" to 3/16" in thickness for delicate work. The safety slip permits the tool to disengage from work if fouled; this is said to prevent breakage of blades and machinery.

An Air Powered Mixer

A portable batch mixer is announced by a New England manufacturer. Operated by an air motor, it is said to

LITTELL Air-Blast Valve



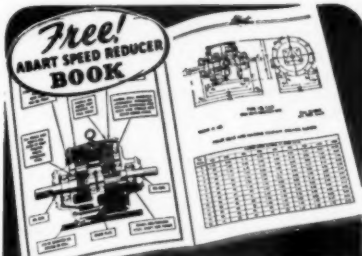
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Automatic Roll Feeds—

dial feeds, magazine feeds, hopper feeds, for punch presses. Reels for coiled stock. Send for Circulars.

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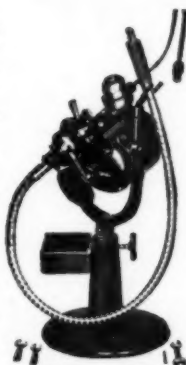
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GEARS Quality gears made to meet most requirements. No stocks. Cut to B/P or specifications only.

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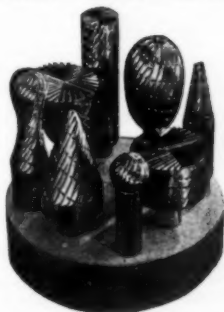


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Fig. 1334
Pat. Applied For



Fig. 1748

• Keep your tools safely under lock and key with this handy "Hallowell" Steel Tool Stand. This stand rolls easily right to the job . . . saves steps, time and money as well as providing tool protection. Write for details and prices.

**STANDARD
PRESSED STEEL CO.**
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be suitable for the average job in 50 or 100 gallon containers.

This completely enclosed unit is especially useful in places where splashing of materials, water, or fumes may be harmful to an electric motor. It is also said to be explosion proof and free from danger in the presence of serious fire hazards.



The $\frac{1}{4}$ h.p. air motor is equipped with ball bearings. Maximum speed is 2000 r.p.m. at 100 lbs. pressure. The motor is provided with an exhaust silencer.

Lightweight Frequency Meter

A new vibration frequency meter has been developed, weighing only eight ounces, and designed to aid the engineer in ferreting out the causes and cures of troublesome machine vibrations. The new instrument is no larger than an engineer's slide rule, but it can indicate what frequencies between 500 and 20,000 cycles per minute are present in a vibrating body.

This compact device is built around the principle of the vibrating-reed and consists of a thin spring steel vibrator clamped at one end between a set of steel rollers. A knurled knob connected to the rollers permits their rotation, and moves the steel reed in or out,

changing its frequency of vibration. A sliding pointer on the back end of the steel reed indicates the vibrating frequency which is read off the calibrated scale on the frame of the instrument.



To use the meter, its head is held against the vibrating body and the adjusting knob rotated until the vibrator reed moves to and fro at maximum amplitude. If more than one vibrating frequency exists, there will be a point of maximum amplitude for each, and vibrations in differing planes may be detected by changing the axis of the meter. The meter is said to be very sensitive, indicating a vibration whose double amplitude is one thousandth of an inch or greater. It can measure harmonies of basic vibration frequencies. Although not designed to measure the amount of vibration, it may be used as a rough indicator of its magnitude.

The meter is solidly constructed of high strength steel, and will stand all normal rough treatment without losing its calibration. Because all moving parts are direct connected, i. e., no gears or gearing employed, back-lash is non-existent in the adjusting knob, and the indicating scale.



Two Ace Welders in metal trim plant—operate 24 hrs. per day (3 shifts). Increased production paid for welders in two months.

Don't Let Out-of-Date Equipment Retard Your Output

Modern spot welding equipment—Ace Welders are making new records in many plants—paying for themselves by increasing hourly production.

Relatively a new industry—there are rapid changes in welder designs and construction and you can well afford to consider what the latest model Ace Welders can do for you as production tools.

If you have not used spot welding previously, let us show you how time is saved and preparation eliminated,—such as punching holes and handling rivets.

Our experience which covers the whole period of spot welder development is at your service.



Our Catalog 40-H will be mailed on request.

Write for Catalog 40-H

PIER EQUIPMENT MFG. CO.

897 Cross Street, Benton Harbor, Mich.

PEER

ACE SPOT WELDERS

Straightening Armor Plate

The necessity for straightening armor plate has created a new important job for bending presses in recent months.

Upon heat - treating armor plate it often becomes warped and must be hammered back to shape. Bending presses have been discovered as a fast economical method for performing this work.

A press is shown, straightening armor plate 2-½" thick and having a tensile strength of 170,000 lbs. per square inch. Dozens of presses have been purchased for this work. The machines usually run continuously 24 hours a day.

Tremendous power is required for plate straightening, since the ram of the



press hits at full tonnage capacity every stroke of the machine. One hundred, or several hundred strokes are required as the condition of the plate demands. Presses run at 20 to 40 strokes per minute depending upon plate thickness.

HEAVY DUTY SPOT WELDERS

In use by the foremost industrial plants in the United States and Foreign Countries.

Self Contained Steel Cabinet Construction units. Specially built and insulated air cooled transformer guaranteed to withstand 100% overload—Adjustable or stationary lower horn—Swivel action foot pedal—Silver to silver contact, variable heat control switch.

Foot, air, or motor operated in capacities from 2½ to 50 Kilowatts—Rocker arm or vertical press type. Bench type available in 2½, 5, and 7½ Kilowatt capacities.

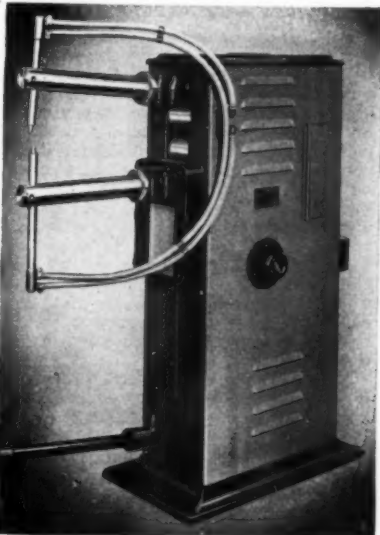
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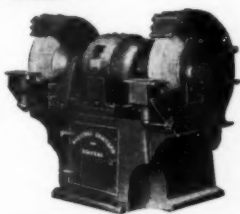
Kansas City, Mo.



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YOU CAN'T JUDGE a book by its cover—nor a machine by its paint. Check the MARSCHKE Heavy Duty Grinders and Buffers. Refinements of design give them superior efficiency, time-saving operating conveniences and extra safety. Good materials and workmanship give them long, economical life.

There's a MARSCHKE floor stand or swing frame Grinder, or a MARSCHKE Buffer, for every requirement of the metal industry—up to 30-inch wheels and 25 H. P. Every MARSCHKE is a *quality product* and *quality* makes you more money in the end.



Call the Marschke representative in your vicinity, or write direct for illustrated Marschke Grinder and Buffer catalog.

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BRIDGEPORT No. 47W Wet Cut-Off Machine



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Capacity 2" in tubing, 1" in solid bars. Our model 48-W handles 3½" tubing, 2½" solid bars.

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Federal "built for service" Presses will enable you to obtain "peak" production at minimum cost. There's a type and size to meet your need. These presses embody all the finer qualities that will help you increase production and meet present conditions.

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Eye Protection For Gas Welding

An improved eyeshield for use on gas welding, cutting and blow torch operations is announced. This new eyeshield, designated as Type BX, is a cover-all shield, the use of which does not interfere with the wearing of prescription glasses. Enlarged opaque fiber side pieces afford greater protection. The light, opaque frame fits snugly to forehead and cheeks, barring light and sparks.



The shield takes a standard 2"x4-1/4" lens, secured in the lens retaining frame by an improved spring. Connection between shield and the sturdy headgear provides better adjustment of lens angle with reference to the face. This type of eye protection is preferred on many types of work because of the wide range of vision afforded and the ease with which the entire lens assembly can be pushed up out of the way when not needed. Lightness and non-fogging features are said to encourage workmen to use this shield.

Individual Fluorescent Lights

An Ohio manufacturer offers fluorescent lights mounted on a wide variety of flexible arms, providing adjustability to fit the individual lighting problem. An assortment of bases and clamps permits attachment of the fixture to almost any machine tool or piece of equipment. The unit may be placed just where the worker most

LUMA

Combination
Etchtool —
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Tools
in 1



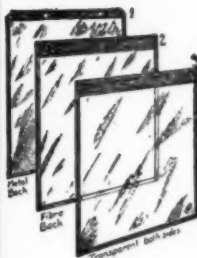
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Writes on hardened steel — demagnetizes at the same time—with carbon point does light spot annealing and soldering jobs. Compact—easy to use—dependable.

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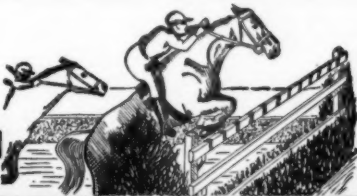
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1422 E. 109th St., Cedar 4728, Cleveland, O.

Write today
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Taking the Hurdles In Air Power

This Norgren Vitalizer Unit cleans and lubricates the power that drives pneumatic tools. The Strainer removes the dirt and 92% of the moisture. The Sight Feed Air Line Lubricator **automatically** conditions the tool (lubricates it **while running**) by injecting an **accurately controlled** oil fog into the air stream. They reduce down time—cut oil costs—pay for themselves quickly.

C. A. NORGREN CO. INC.,

214 Santa Fe Drive,
Denver, Colo.

needs the light, whether it is six inches or several feet from the work.



This firm has recently announced its No. 600 series. All of these models are of the small, portable type, using one tube of either 15 or 20-watt size.

Vertical "Explosion Proof" Motors

A West Coast manufacturer announces an "explosion proof" motor suitable for vertical applications in both Class I, Group D and Class II, Group G locations as defined by the National Board of Fire Underwriters. The first class embraces locations in which flammable volatile liquids or other highly flammable substances are present. The second class includes locations in which combustible dust is present as in flour or feed mills.

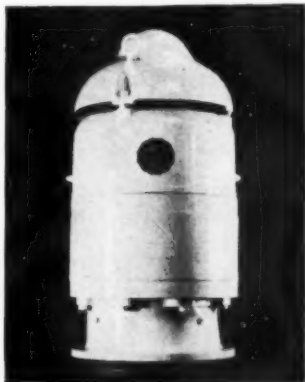
The unit is fan-cooled and has asbestos protected windings. These are said to be especially important, as explosion proof motors are rated 55° centigrade rise or 37% higher than standard motors. These new motors are offered with a variety of mounting flanges.

Imports Swiss Micrometers

A New York firm has obtained American agency for a Swiss manufacturer of horizontal and vertical bench micrometers. This line of micrometers is said to be quite well-known in Europe, especially among the manufacturers of watches.

The importer points out that these precision instruments are of value not only to watch, clock, and meter manufacturers but also will be found useful in modern toolrooms.

The horizontal micrometers are offered with revolving and non-revolving spindles and with anvils of various diameters and shapes. Ranges offered in the horizontal type are zero to 1" and 1" to 2". Both these and the vertical micrometers give readings with vernier of .0001".



THE PRECISION UNIVERSAL TOOL HEAD



brings all adjustments under absolute micrometric control of the operator without stopping tool or machine. In Jig Borer, Milling Machine or Horizontal Boring Mill, it bores, faces, counterbores, turns outside diameters, mills flat surfaces and slots, under-cuts, recesses, back-faces and does an almost limitless range of "headache" jobs. Send for bulletins. Address all communications, inquiries and orders to

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HOTEL ESSEX



Guaranteed comfort—and we mean it. Latest colored tile combination tub and showers—newly furnished and decorated thru-out — You'll like it.

\$1.75
SINGLE
Ellis at Larkin

\$2.50
DOUBLE
San Francisco, Calif.

LINCO Two Spindle Adjustable Drill Head

Drills two holes at once, engineered for all types of drill presses and is especially adaptable for small presses such as Canedy Otto, Demco No. 15 and similar. Drill centers 7/8" to 6", speeds up to 3600 R. P. M., capacity drills 5/16" to 1/2". Two sizes, the smaller, with aluminum gear case

only 9 1/2 lbs. Roller and ball thrust bearings. With attachment may use for tapping.



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Lead screw ground from the solid AFTER hardening

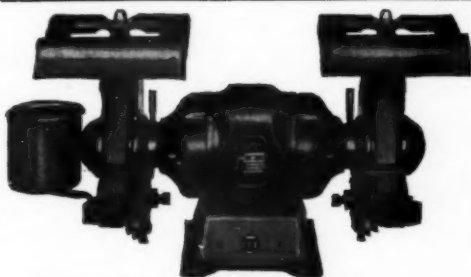
SMOOTH and compact. Constant accuracy. Parts subject to wear are hardened. Large offset adjustment eliminates need for offset boring bars. Lead screw is hardened tool steel. Its threads are ground from the solid AFTER hardening.

Criterion heads are unexcelled in accuracy, in ability to withstand constant use. Two sizes 1 1/4" and 3". 1/2" and 1" bar capacity. Order from your dealer or write direct Request free literature. No obligation.

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Boring Head



CRITERION
MACHINE WORKS
BEVERLY HILLS, CALIFORNIA



**a Real Buy
at \$45.00**

New BALDOR Grinder No. 724 has separate, combination lights and eye-shields; tool rests are tiltable and adjustable to and from wheel and up and down; water pot, 1/2 HP motor, 3400 rpm; 60 cy. 7"x1" ALOXITE wheels, Price, \$45.00 without bulbs,

2 YEAR GUARANTEE against BURN-OUT

The COMPLETE LINE of BALDOR Grinders (bench and pedestal types) described in BULLETIN 77. Ask for it.

BALDOR ELEC. CO.
4368 Duncan Ave.,
ST. LOUIS, MO.

BALDOR
BALL BEARING **GRINDERS**

AMMCO 6" SHAPER

"A precision machine of a thousand uses"



- - IT'S PORTABLE - - **Saves Steps and Time**

Don't tie up a big shaper when so many jobs can be done just as accurately and much quicker on AMMCO 6" PRECISION SHAPER . . . Available for stationary installation or mounted on portable cabinet easily rolled to the mechanic's workbench.

Features of this Shaper include quick adjustment of stroke, ram position, tool head, table height, table support, feed and speed . . . The maximum

length of stroke is $7\frac{1}{4}$ " . . . Table has five cross feeds (reversible) . . . Countershaft has three-step cone pulley . . . $\frac{1}{4}$ or $\frac{1}{2}$ H.P. Motor.

Manufactured by an organization having years of experience in producing precision machinery . . . Recommended by leading machine tool dealers and machine tool manufacturers.

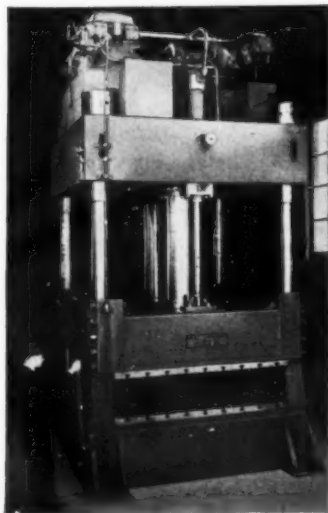
Write for Specifications and Prices.

AUTOMOTIVE MAINTENANCE MACHINERY CO.
2112 Commonwealth Avenue, North Chicago, Ill.

What's New in the Industry

Heavy Duty Hydraulic Presses

AN INDIANA manufacturer offers hydraulic presses ranging in size from 300 to 700 tons. A general picture of these large machines is suggested by the following description of a typical 600 ton model:



This is a high speed, self-contained, hydraulic press, arranged for direct connected motor drive and complete with motors and starters. Capacity is 600 tons, stroke 49", and maximum opening, stroke up, is 60". Distance between columns is 84" in either direction; platen size right to left is 108", front to back 84". Different platen and between-column dimensions are avail-

able, however, depending on the buyer's requirements.

This press is offered with either of two pumping units. Unit No. 1 is driven by a 30 h. p. motor at 860 r. p. m. Operating speeds, in inches per minute are estimated as follows:—pressing, 11"; advance, 350"; return, 320". Unit No. 2 includes a 60 h. p. motor and an operating speed estimated at 21" for pressing, with advance and return speeds the same as with unit No. 1.

Although the stroke is 49", this press is equipped with automatic stroke control on the up stroke, so it may be operated on a short stroke most suitable for the work to be performed. It is pointed out that this feature often effects substantial savings in time.

The base and top crown of this rugged press are of welded steel construction, heavily reinforced to give rigidity. Ram is of welded steel, heavily ribbed and reinforced. Press is equipped with two single acting cylinders and two double acting rapid traverse cylinders.

The press base is equipped with three knockout cylinders of 30 tons capacity each. The motor-driven hydraulic system for operating them is separated from the main hydraulic unit and is mounted in the base.

The press is operated by means of a hand lever or a pedal which controls its speed. The control is spring-loaded so that releasing the hand lever or pedal reverses ram motion at any speed desired up to the maximum.

This machine weighs approximately 125,000 lbs.

New Vertical Optical Comparator

A New England manufacturer has added a new vertical Optical Comparator to an already extensive line of Optical Comparators that covers the

whole field of projection inspection. This all-metal machine is of rugged construction, suitable for laboratory or shop use.

Set in the 8"x7" object staging table, central with condensing and projection lenses, is a 3-1/4" diameter glass disc on which objects may be staged for projection. To focus object, the table is adjusted vertically by a screw at top of machine.



A substantial 8" diameter ground and lapped mirror, coated with aluminum oxide, reflects the object shadow onto a 14" diameter receiving screen. This screen is located in a convenient position for operator to study the shadow outline.

This machine is designed for checking small, flat objects which can be laid directly on the glass stage. Enlarged shadow of the contour can be compared with an outline on the screen.

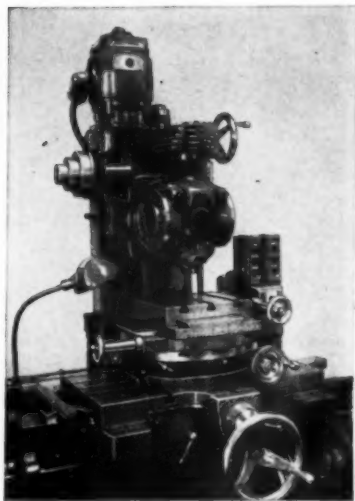
A table for making co-ordinate measurements is available. The table slides are made of hardened steel and the 5/16" diameter balls which support and guide the slides, operate in accurately ground Vee ways. Table will measure up to 2" sideways and 1" backward or forward. It can be equipped with mi-

croimeters graduated to read .0005" or .0001". Several projection lenses are available:

No. of Magnifications	Distance Lens to Object	Maximum Diameter Lens Will Project
6	3-7/16"	1.500"
10	1-13/16"	1.000"
20	1-5/16"	.700"
31 1/4	2-7/8"	.440"
50	2-7/8"	.280"
62 1/2	2-7/8"	.220"
100	1"	.140"

Two Attachments for Multi-purpose Tool

An Illinois manufacturer announces two attachments for his well known multiple purpose machine tool. A compound slide rotary table is offered which will mill round posts, other irregular sections or inserts from solid material.



Radii of various lengths can be machined from centers selected at will. This table also makes possible other operations such as slotting, filing, and grinding.



*Small Things to do
that will Help you
Avoid Headaches*

Order that Next Lot of Jig Bushings from ACME

Because—

You can choose from a complete stock of both A. S. A. and Acme Standards.

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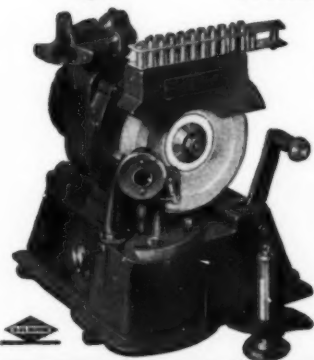
MONroe 4122



Grind *Your* Drills On

"BLACK DIAMOND"

Precision Drill Grinder



Even an unskilled operator can do a precision job of drill grinding—handles sizes from No. 60 wire gauge to $\frac{3}{4}$ "—easily, quickly and without any complicated adjustments. Saves time, drills and possible damage to the work.

Let us send you Bulletin No. 121-H.

BLACK DIAMOND

**SAW & MACHINE WORKS, INC.
NATICK, MASS.**



Holding Washers for Drilling

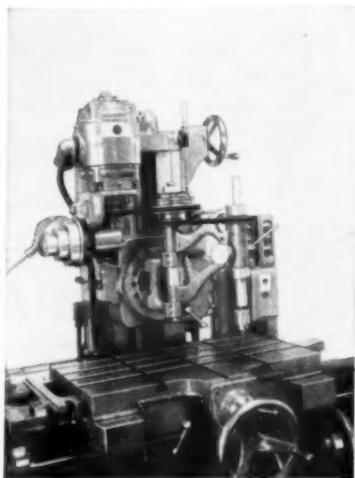
Small Work or Big Work— DE-STA-CO CLAMPS HOLD

From small work like washers, to big work like automobile bodies—and for every operation from welding to machining—you'll find a De-Sta-Co quick-acting Toggle Clamp fitted to hold your parts securely, in production, and suited to your manufacturing processes.

Complete range of sizes and detailed specifications are shown in Bulletin No. 40, sent on request.

DETROIT STAMPING CO.
Established Over 25 Years
347 Midland Ave. • Detroit, Mich.

A radial drill attachment is also available. It is said to be especially useful for drilling and reaming holes in punch holders and die shoes during the assembly operations of moderately large sectional dies. This unit may be easily attached or removed without disturbing the work.



Threading Alloy Steels

A helpful leaflet on threading alloy steels is announced by the Geometric Tool Co., New Haven, Conn. Many of the elementary phases of the subject are covered briefly. "Chamfers," "Face Grinds," and "Threading Speeds" are the headings of three of its paragraphs. Two charts are included showing recommended face grinds and proper threading speeds for several alloy steels.

Geometric believe that this unpretentious leaflet will prove helpful to learners and also to shop men threading alloys for the first time.

Hart Milling Fixtures

A new bulletin is announced by the Hart Machine Co., 26 Mather St., Dorchester, Boston, Mass. Its subject is the Hart patented milling fixtures and dividing heads. Specifications are given as well as numerous photos giving details of construction.

Milling Machine With Independent Feed

An interesting new No. 2-20 Milling Machine having hydraulic feed to the table is announced.

It has a table 42" long by 12" wide with 20" travel, and a fully automatic cycle. Table can be fed or rapid traversed in either direction, automatically shifted from rapid traverse to feed in either direction, and automatically reversed at both ends of stroke. It may be automatically stopped at any desired point in its travel.

An unusual feature permits independent adjustment of feed rate for opposite directions of table travel. This permits an operation at one end of the table and an entirely different operation at the other end. Each direction of table travel has a separate feed rate control dial which is adjusted independently of the other. Feed to the left can be set at 4" per minute, and to the right at 10" per minute. Similarly, this independent adjustment permits setting feed rate exactly the same for both directions of table travel.

Any one of three spindle speed ranges can be furnished. A medium range of 64 to 860 r.p.m. is standard—either a low range of 32 to 428 or a high range of 96 to 1284 r.p.m. can be provided. Wide face, quiet running pick-off gears are spline mounted and easily removed for making spindle speed changes.



Spindle is driven by motor mounted at rear, and hydraulic pump, by a separate motor enclosed in base. Both are standard foot mounted ball bearing types, readily accessible. There are only two gear contacts in spindle drive from motor to cutter.

Spindle speed range is 13.35 to one in any one of three selected ranges; infinitely adjustable feed range for opposite direction of table travel is $\frac{3}{4}$ " to 38" per minute.

Pressed Steel Dipping and Pouring Kettles.

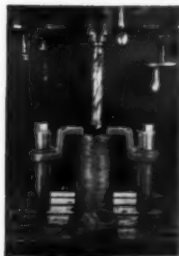


Write for circular today.

Many types and sizes—
bent and straight handles—
open and covered
spouts.

Also manufacture ladles,
skimmers, and melting
kettles.

SALEM TOOL CO.
Salem Ohio, U.S.A.



NOTHING To Worry About

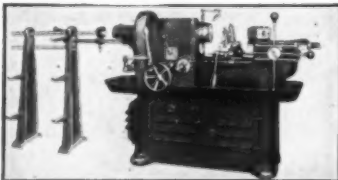
If your work is securely
held with Howell Patent
High Speed Adjustable
Work Clamps. Time and
trouble savers—Flexible.

Write for circular.

Howell Clamp Co.
1373 E. 95th St.
Cleveland, Ohio



Welding pipe for a new 43-mile, 58" water line at Rangoon, India. Fabricating the pipe consisted of placing three 25-foot lengths of rolled plate, 62" wide by 7/16" thick in specially made rings, welding the three inner longitudinal seams by one pass—then removing rings and welding outer seams. Photo—Courtesy Lincoln Electric Co.)



MOREY No. 2-G TURRET LATHE

**RANGE: 90 to 1800 RPM or
180 to 3600 RPM**

Motor driven. 1" wire feed. 6½" turning length. Designed particularly for the use of modern cutting tools. Handles a wide variety of work at low cost.

Send for your copy of circular No. 629.

Morey Machinery Co., Inc.
410 Broome Street, New York, N. Y.

GRIT - CUT ABRASIVE CUTTER



Designed for tool rooms. Can be utilized for light production. Two convenient sizes for mounting on bench. Legs supplied at an extra cost. An inexpensive cutter costing only

\$140.00

Does quick and accurate cutting at minimum cost. No job too hard for Grit-Cut.

For quick repairs the cartridge type spindle can be removed and assembled spindle substituted.

The No. 6 machine capacity is 1" solid or 1¼" tubing. Size of wheel is 6". Motor is ¾ h.p., 3450 R.P.M. Spindle speed 10,000.

Let us send you complete details.

WILLIAM BOUGHTER
Whitehall Rd. near Township Line, Norristown, Pa.

All Roads Lead To
COMFORT
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500 ROOMS
 All With Tub & Shower

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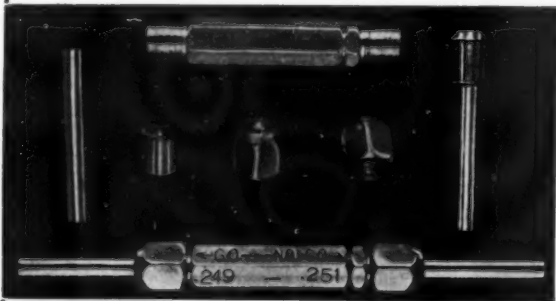


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Successors to Lathbough-Jordan Tool & Machine Co.
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Look! **Get Double Your Money's Worth**



**Precision lapped
 to the brilliance
 of a diamond.**

**Tolerance for
 sizes .030" to
 .500" is .0005"**

**Tolerance for
 sizes .500" to
 1.000" is .0008"**

Gauging members can be turned on opposite ends when worn, giving plug 100% more life. Note the new aluminum handle and new brass collet construction.

*All U. P. P. products guaranteed—25,000 gauges carried
 in stock—Shipment usually made the same day.*

UNITED PRECISION PRODUCTS CO.

**4616 W. HURON STREET
 CHICAGO, ILLINOIS**

A group of future machine tool operators get their first lesson in the handling of a turret lathe in Jersey City, New Jersey's Dickinson High School. (Photo—Courtesy Westinghouse)



TANNEWITZ *High Speed* METAL CUTTING BAND SAWS

Fastest and best known means of cutting sheet steel aluminum and magnesium sprues, gates, risers, and kindred items.

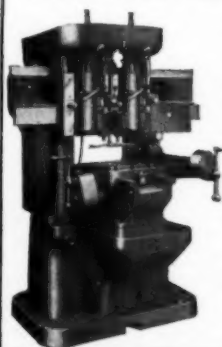
Provides sawblade travel of over 2-miles per minute with **PERFECT SAFETY**. Cuts are exceptionally smooth.

Write for Metal Cutting Band Saw Bulletin.



**THE TANNEWITZ WORKS
GRAND RAPIDS, MICHIGAN**

Economical Duplicate of SMALL PARTS Vertical Profiler & Milling Machine



MOREY has designed this machine for the manufacture of small parts requiring accurate interchangeability. May new and exclusive features make it "tops".

It is modern in every detail—fast, economical.

Let us send you our latest circular No. 680, giving all the detailed specifications of this time and money saving machine.

Morey Machinery Co., Inc.
410 Broome Street, New York, N. Y.

P. & W. Bulletins Four New Machines

Rifle and gun barrels are but two of many important products which will be produced by the new model machines announced by Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford, Conn.

All of these modern machine tools, except the chambering machine, are of "twin" design, capable of cutting two pieces simultaneously. This design obviously increases production and saves floor space, making it possible for the operator to reload and start one spindle while the other is in operation.

Deep hole drillers are the subject of Circulars Nos. 451 and 452. The former describes the drillers designated as Nos. 1/2B and 1B. These machines are available in sizes ranging from 5/8" diameter and 30" length of hole to 1" diameter and 74" length.

Bulletin No. 452 describes the large No. 1 1/2 deep hole driller, which has 11" swing over bed. This machine is offered in four models varying in capacity from 2" dia. by 37" length to 2" by 105".

Deep hole reamers Nos. 1/2B and 1B are offered in Circular No. 453. Although designed primarily for reaming rifle barrels, they also will handle any other type of reaming work within their range. Four models will hold, in standard fixtures, work with a maximum diameter of from 1 3/4" to 2 7/8".

Gun barrel rifling machines Nos. 1/2B and 1B are depicted in bulletin No. 455. Like the drillers and reamers, these are "twin" machines. The heads move independently of each other under hydraulic drive. Maximum rifling diameters and lengths vary from 5/8" by 30" to 1 1/8" by 98".

A gun barrel chambering machine, No. 1/2B, is portrayed in Circular No. 454. It performs the complete precision operation of chambering a previously rifled gun barrel to receive the cartridge. The turret of the machine contains 10 tool spindles. Both models handle a maximum gun bore of 5/8". One model has a work capacity of 30" in length, the other 50".

**SAVE
TIME—MONEY
... PUT THIS
FAST GRINDER ON
EVERY TOOLMAKER'S
BENCH**



KIPP^{air} GRINDER

Kipp Air Tools give you the highest speeds, lowest prices, and are proving indispensable in tool room and production departments. Grinders sell from \$9.75 to \$58.75, Chippers and Filers at \$19.75. The BB Grinder illustrated is only \$25. Try one of these handy, fast tools in your own tool room. The FREE trial offer permits any concern with a satisfactory credit rating to try out any Kipp Air Tool for ten days. New catalog gives details.

**10 DAY FREE TRIAL
NO OBLIGATIONS**



- ☐ Send Kipp Air Grinder Model BB on your 10 day Free Trial Offer!
- ☐ Send the new Kipp Air Tool Catalog!

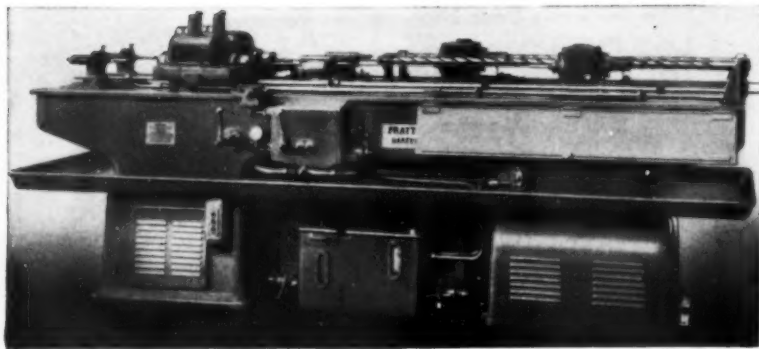
Name.....

Company.....

Address.....

MADISON-KIPP CORPORATION

207 WAUBESA ST., MADISON, WIS., U. S. A.



Gun Barrel Rifling Machines

A New England manufacturer announces a new gun barrel rifling machine in five standard models.

This modern machine has been designed for production work within the unusually close limits of accuracy required for such work. Two features aiding high production are hydraulic control and "twin" design. In other words, the machine incorporates two complete rifling units, operating independently. This saves floor space and makes it possible for the operator to feed one unit while the other is in operation.

The rifle barrel is held in a work spindle by means of a collet chuck. The end of the barrel is steadied by a work end support. At start of the operation, the rifling tool extends through the work to the tool feeding device at the extreme left. The pull type hook cutter is drawn to the right through the barrel.

Upon its return the barrel is automatically indexed for the next groove. After a complete revolution, the rifling tool is fed deeper automatically. When the rifled grooves have reached a predetermined depth, the feed stops. The entire cycle is automatic.

The sliding heads shown at the right move the tools longitudinally. They contain the tool spindles, which are geared to nuts transmitting the correct helical motion from the fixed rifling leaders. These heads move under hydraulic drive and have an infinite range of speeds up to 50" per minute. Separate control knobs for cutting and return motions allow each to be set for maximum efficiency.

The gun barrel rifling machine No. 1½B is offered in two sizes. While both have a maximum rifling diameter of 5½", one has a maximum rifling diameter of 1-1½". Sizes available have maximum rifling lengths of 50", 74", and 98".



LIGHT ON THE JOB! **WHERE LIGHT IS MOST IMPORTANT**

Speed production, cut rejects, increase efficiency and morale by giving your workers adequate light **on the job** for better "seeing". Fostoria Localites solve the problem. Over one thousand machine, bench, table and overhead models. Write for catalog No. 25, today.



**THE FOSTORIA PRESSED
STEEL CORP. Fostoria, O.**

TROYKE ROTARY TABLES

Accurate—Sturdy—Moderately Priced.



Made in
7 sizes.
from
9" to 25"



Ask your dealer or write us for
new 1941 8-page catalog.

ALFRED A. TROYKE, 4422 Appleton St.,

OAKLEY, CINCINNATI, OHIO

A New Toolroom Furnace

A new Venturi-Toolroom Bunsen Furnace is announced by the Besocke Tool & Mfg. Co., Arcadia, Calif. Fired by natural gas, this new furnace uses featherweight Cellosil bricks as its lid.

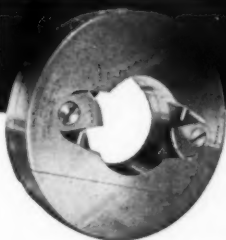


These bricks have taper surfaces, and it is asserted that they can be handled by hand regardless of the amount of heat striking them.

In many applications, it will be found convenient to suspend the work on stove pipe wire on a rod, as shown in the illustration. The hook on the end of the rod makes it easy to quench the piece after heat-treating if desired. It is pointed out that round long bars can be heated by placing the bar between the taper surfaces of the bricks.

Bulletin on Deep Hole Drill Sharpener

Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford, Conn., announces a new bulletin on its deep hole drill sharpener. Circular No. 450, as it is called, points out that the deep hole drill, unlike ordinary drills, must have a peculiarly formed tip with definite accurate angles and surfaces. It is declared that this cannot be done properly and with consistent accuracy by haphazard free hand grinding. The deep hole drill sharpener has been designed to fill that need.



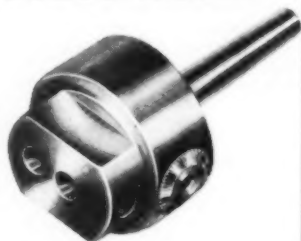
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Automatic
WORK DRIVER

Self Centering... Quick Acting... No Slip. Attaches to any chuck plate or spindle. Provides a slip-proof, balanced drive reducing chatter. Handles rough forgings or turned pieces—straight or taper. Eliminates dogging time. Reduces tool breakage. Write for details and size range.

SENECA FALLS MACHINE CO., 314 Falls St., Seneca Falls, N. Y.

FRAY
MICROMETER
OFFSET BORING
HEADS
ELIMINATE
GUESS-WORK



WRITE FOR
 BOOKLET.



FRAY MACHINE TOOL CO.

MAKERS OF

"ALL ANGLE"

MILLING MACHINES

AND

MILLING ATTACHMENTS.

GLENDAL, CALIFORNIA

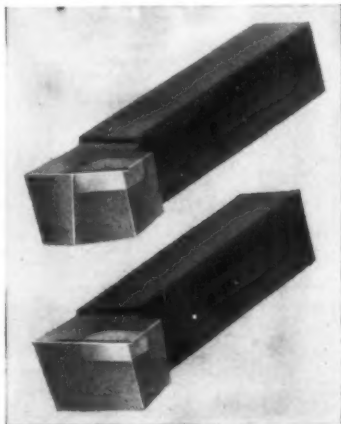
U. S. A.

New Kennametal Tools

McKenna Metals Co., 135 Lloyd Ave., Latrobe, Pa., announces two new styles of tools for facing operations in turret lathes, added to their standard line of Kennametal tools for machining steel and other metals.

Known as Style Nos. 21 and 22, these new tools have 6° side and front clearance angles, 8° end cutting edge angles, 6° side rake and 2° negative back rake. Style 21 tool (shown at top of illustration) has a 20° side cutting edge angle which is said to increase tool life. Therefore this tool should be used where a 90° shoulder on the work is not required. For facing to a 90° shoulder, Style 22 tool, which has a zero side cutting edge angle, should be used.

The negative back rake on these new tools is characteristic of most standard Kennametal tools, where the non-galling action of the tip permits this unorthodox tool angle to be employed to advantage. Use of the negative back rake has the effect of imparting greater strength to the carbide tip. It will also be noted in the illustration that



these new tools are supplied with chip breakers:—Style 21 tool has a groove type chip breaker ground parallel to the side cutting edge, while Style 22 tool has a shelf type chip breaker ground 5° from side cutting edge angle.

Midget Positive Pressure Pump

Eastern Engineering Co., 45 Fox St., New Haven, Conn., announces a new midget size pump known as Model "UT."

It is self priming, capable of high pressures and is compact.



It is adapted for any application in which the location of tanks and containers make the self-priming feature essential, particularly installations requiring the pumping of thin liquids where weight and space involved must be kept at a minimum.

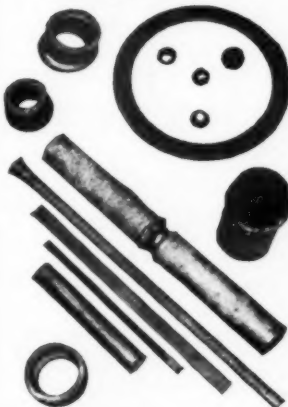
Under performance it is said to provide a maximum pressure of 35 lbs. per square inch. Maximum volume of 3 gallons per minute.

Size is 6" x 3" x 2½" and weight, 3½ lbs. Motor is of the universal fan cooled type, 1/20 h.p. Stuffing box is adjustable by means of hand operated adjustment wheel.

Nozzles are designed for use with ¾" inside diameter rubber hose only, and are not threaded for pipe fittings. Nozzles are removable and may be replaced with standard ½" pipe.



(Pronounced COLE'-MON-OY)



CERTAINLY YOU CAN CAST IT!

There are many cases where solid castings of COLMONOY are highly desirable such as centerless grinder rests, saw guides, seal rings, valve seats and many other small parts.

COLMONOY may be also be cast-on, saving a great deal of time where several duplicate parts are hard-faced at one time. Casting results in a smoother surface than welding, and with a metal as hard as COLMONOY, the saving in machining is important. Send us your blue-prints for quotation.

CATALOG ON REQUEST.

WALL-COLMONOY CORP.

Sixth Floor, Buhl Bldg., Detroit, Mich.

NEW YORK

566 W. 54th St.

WHITTIER, CALIF.

123 W. Philadelphia St.

TULSA

228 Midco Bldg.

BUFFALO

2155 Seneca St.

CHICAGO

2054 W. Harrison St.

COLMONOY

Hard Surfacing Alloys and Overlay Metals

ACROMARK
TRADEMARK

**NAME-PLATE
STAMPING
MACHINE**

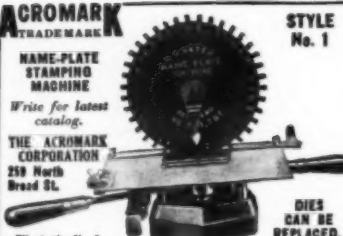
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catalog.*

THE ACROMARK
CORPORATION
259 North
Broad St.

Elizabeth, N. J.

STYLE
No. 1

DIES
CAN BE
REPLACED.



MICROMETER OFFSET BORING HEADS



No. 35

\$70.00

A New Flynn Micrometer
Offset Boring Head
Write for catalogue.

Boring Bars

The new small
bars $\frac{3}{16}$, $\frac{1}{4}$, $\frac{5}{16}$
and $\frac{3}{8}$ in. dia.
Set of 4—\$5.
Larger bars
up to 1½ in.
diameter.



Flynn Manufacturing Company

435 Bates Street Detroit, Michigan

Extra Light "Multi-Vane" Drills

Ingersoll-Rand announces two new additions to its "Multi-Vane" Drill line—new sizes 00 and 0. These new tools



are extremely light in weight ranging from 1½ to 2-7/8 pounds. Numerous attachments can be furnished to adapt these tools for light screw driving, nut running, close-quarter drilling, wire brushing, sanding, etc. Three different types of handles (straight, lever throttle, or pistol-grip) are available.

For further details address Ingersoll-Rand Co., 11 Broadway, New York City.

Adjustable Clamp Issues New Catalog

A new Catalog No. 15 was recently issued by Adjustable Clamp Co., 418 N. Ashland Ave., Chicago.

Many new items are included as well as added sizes and minor changes in established lines.

The principal items are:—"Jorgensen" Style No. 70 Steel "T"-bar Clamps;



STYLE A

The HAMILTON PORTABLE ELEVATING TABLE—"PORTELEVATOR"

No strained backs or bruised fingers if you let the Hamilton "Portelevator" do the lifting for you. Use it as means of support—Use it to level large overhanging pieces of work—Use it as a bench to work on—An economical and efficient helper—One to twenty ton hand or power operated.

Write for full details today.

THE HAMILTON TOOL COMPANY
B AND WAYNE STS., HAMILTON, OHIO



NOW . . ONE MAN DOES THE WORK OF THREE !

Don't let surface preparation be a bottle neck in your production. With the remarkable new air-driven Sterling SPEED-BLOC sander, one hand does the work of three in sanding, rubbing and polishing flat or curved surfaces, wet or dry. It is widely used to sand filler and lacquer coats on machine bases.

The Sterling slashes production time, cuts labor and abrasive costs, soon pays for itself. No wonder users report savings up to 75% besides getting rid of an old production headache.

Write for full details today.

STERLING TOOL PRODUCTS COMPANY

357 East Ohio Street,

Chicago, Illinois.

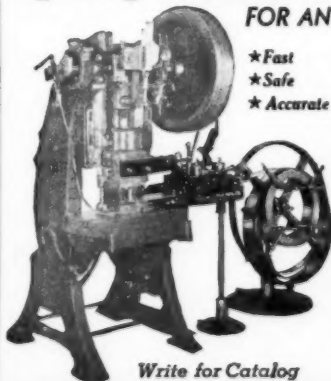
Sterling
**SPEED-BLOC
SANDER**

CUTS COSTS 25% TO 75%

INCREASE SCHEDULES—REDUCE COSTS!

Specify WITTEK Automatic ROLL FEEDS

FOR ANY MAKE AND SIZE OF PUNCH PRESS



Write for Catalog

- ★ Fast
- ★ Safe
- ★ Accurate

WITTEK Automatic ROLL FEEDS—the feeds that have made automatic punch press operation practical. Can be installed on ANY make or size punch press without alteration. Handles ANY type coiled stock, and feeds in any of four directions; right to left, left to right, back to front, or front to back, in any length from 0" to 24" per press stroke.

WITTEK'S improved and simplified operating method does away with complicated moving parts, and insures rapid, smooth, safe, and accurate feeding under all conditions. Made in Single Roll, Double Roll (push-pull), and Compound types, with or without straighteners. WITTEK Automatic ROLL FEEDS save dies, and minimize scrap and maintenance costs.

WITTEK adjustable REEL STANDS are available in 6 types—a type for every job—and will handle any stock (metal, foil, paper, etc.) WITTEK No. 3 (illustrated) has automatically expanding coil holders that center the coil and assure maximum production by eliminating looping, tangling and back-lash of stock.



WITTEK MANUFACTURING COMPANY

4305 W. 24th Place

Chicago, Illinois, U. S. A.

"Pony" C Clamps, Series 200. (Five new sizes and shapes, with a three-way choice of handle forms and opening capacities now ranging from $\frac{3}{8}$ " to $2\frac{1}{2}$ ".) "Jorgensen" Carriage Body and Welders Clamps.

The selection of clamps covers practically all requirements of craftsmen for wood, metal or other materials, from fine wood or sheet-metal work to the heaviest welding or fabricating service.

Copy of the catalog will be mailed on request.

The
**HAMILTON
MUEHLMATT**
Super Sensitive
**DRILLING
MACHINES**



The Muehlmann Drilling Machines solve the problem of drilling small holes in the smallest wire gauge sizes.

They are used extensively for drilling Diesel Injector Nozzles, Instrument and Jewelry work. Users report 100% savings on drill breakage.

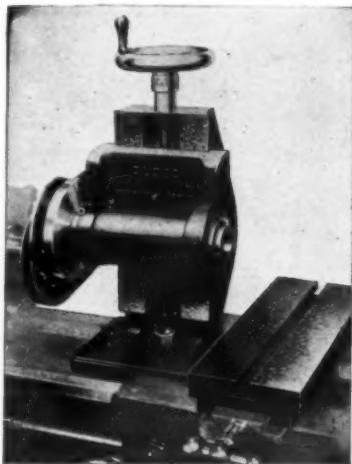
Muehlmann Drilling Machines are the answer to your drilling problems. Let us tell you more about them.

Send for complete details.

The Hamilton Tool Co.
B and Wayne Sts. Hamilton Ohio

Milling Attachment for Lathe

Indicated in position on a lathe bed, a new milling attachment employs the lathe spindle for its drive and makes use of the carriage movements to operate its table. The spindle is carried on a vertical slide so the spindle can be positioned, or moved up and down.



Among other accessories enabling the operator to cover a wide variety of work, is a ball bearing arbor support for attachment to the lathe tailstock spindle so a cutter arbor can be applied in manner similar to that on a standard plain milling machine with

GROBET
ROTARY FILES
ground from the solid



Ask for Catalog WG

the most complete catalog of its kind, illustrating hundreds of rotary files hand cut, milled cut, ground from the solid; also diesinkers' burs.

GROBET FILE CORP. OF AMERICA 3 Park Pl., New York, N.Y.

an overarm. It also is possible to mount a chuck on the end of the arbor at the milling head in raised position and set a standard lathe tool on a block on the carriage, to swing larger work in a turning operation than the lathe will take on its own headstock.

The spindle is mounted on ball bearings and is fitted with a No. 9 B. & S. taper. It is driven by V-belt sheaves and belts connecting to a sheave on the lathe spindle in an arrangement which permits vertical positioning through a 6" distance above the table. Overall dimensions of the table are 4 1/4" x 12". It clamps to the cross slide on the lathe carriage as shown.

Originally developed in 1939 and distributed in Southern California only, this tool is now available nationally for Atlas and Craftsman lathes (other than 6" sizes), 9" and 11" South Bend lathes, and 10" and 11" Sheldon lathes. The milling head may also be attached to other makes of lathes, and larger sizes of lathes, by the use of a special adapter base plate, a slight change in the cross-feed screw nut and necessary machining of the base of the column and the table.

It is made by Globe Products Mfg. Co., 3380 Robertson Blvd., Los Angeles, Cal.

Verson Major Press Brakes

A new bulletin is announced by the Verson Allsteel Press Co., 9303 So. Kenwood Ave., Chicago, Ill. Its subject is the "T" series of Major Press Brakes for forming, bending, coping, notching, and multiple punching. Models have capacities ranging all the way from 4' 3/16" mild steel plate to 50' 1".



SCREW MACHINE CIRCULAR
TOOLS IN STOCK. Write for Complete List.
Banner Manufacturing Co.
 1871 Clybourn Ave., Chicago, Ill.

BURKE

MILLING MACHINES

Make Fast Work of Small Jobs

Motor
Driven

Timken
roller or
ball bearings
to
spindle



Write today for
circulars.

Burke Machine Tool Co.
 297 E. 16th St., Conneaut, Ohio

5000
SHAPES AND SIZES
GROBET Swiss Files



Ask for Catalog WF.

The most complete catalog of its kind.
 Lists 5000 different shapes, sizes and cuts
 of GROBET Precision Swiss Files. Ask also
 for catalog WM on files for filing machines.

Learn more about these Chrome Steel Files that have
 won a reputation for utmost precision and durability.

GROBET FILE CORP. OF AMERICA 3 Park Pl., New York, N. Y.

Immediate Delivery

Limited Quantities



Model E reading in

$\frac{1}{1000}$ & $\frac{1}{10000}$

Also Midget Indicators & Pocket Gages.

Waltham Dial Gage Co.
STOW, MASSACHUSETTS



RIVETERS

Available in Noiseless Spinning
and Vibrating Hammer types
—also Vertical and Horizontal
Multiple Spindle
Spinning Machines.



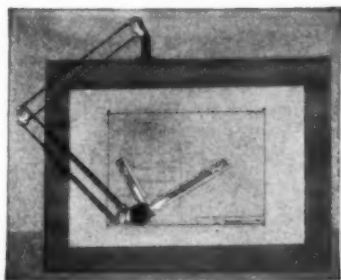
You're invited to send
unriveted samples for
recommendations and
quotations—NOW.

**THE GRANT MFG.
& MACHINE CO.**

C. E. Station
BRIDGEPORT, CONN.

Master Drafto

The Drafto Co., 270 Walnut Street, Cochran, Pa., announces production of a new, low-priced drafting machine, designated as the "Master - Drafto" Model No. 60, which takes a maximum size sheet 24" x 36".



Light in weight for ease of operation, the Master-Drafto is solidly built to stand hard use. The arms are constructed of seamless steel tubing, fitted with solid bearings. The scale blades are designed so that any scale, either boxwood or aluminum, can be inserted. Scales will fit tightly into the blades without deviating from the necessary 90° angle. For center-mounting the machine on a drafting board or table, a cast aluminum bracket is used, containing a screw for leveling the scales parallel to the drafting surface.

An interesting feature is the protractor device. The stainless steel protractor plate is graduated in intervals of 2° and can be set accurately for $\frac{1}{2}$ ° readings by use of the graduated vernier. Graduations are machine cut, and can be read at a glance. Protractor can be locked at any degree, but for speed and convenience, it is fitted with a latching spring to lock the scales at 0, 30, 45, 60 and 90° on either side of the 0° reading.

A "Slide Rule" for Welding and Sheet Metal Work

The Wolfe Angle Meter is announced by the Interstate Sales Co., 1123 Broadway, New York, N. Y. This device



Get wise to
ALCO^{EFFICIENT} TOOLS
ECONOMY

ALCO TAP and DRILL CHUCKS and
 ALCO DIE HOLDERS have these features:

- ★ Full floating feature insures concentricity.
- ★ Simple adjustment—only one wrench needed.
- ★ No bushings—Alco chucks accommodate drill and tap sizes from 1/32" to 5/8" WITHOUT BUSHINGS!
- ★ Perfect holes and threads... Fewer broken drills and taps... Fewer rejections... Less inspection necessary.

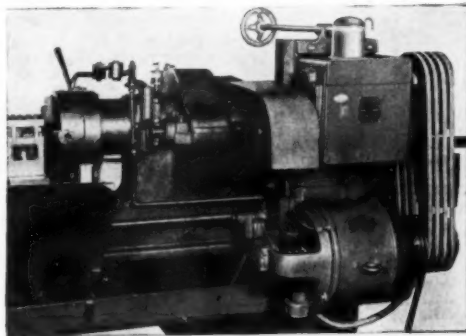
These features represent *real* economies which are reflected in final cost figures. Write!

THE ALCO TOOL CO., BRIDGEPORT, CONN., U.S.A.

ALCO^{EFFICIENT} TOOLS



The Government Priority system as part of the defense program makes it expedient to bring used machine tools up to their fullest efficiency



4 and 8 speed models are now stocked for immediate delivery.

Modernize your old equipment with FlexoID Speed Control Units.

These units convert every type and size of shaft driven machines to individual motor drives, which means added flexibility and economy.

Write for complete details or wire collect for information regarding nearest distributor.

THE SMITH POWER TRANSMISSION CO.

1545 E. 23rd St.

CLEVELAND, OHIO

MAin 9450



"CHAMPION" Steel Racks

Save time, steps and money by keeping bar stock, shafting and pipe out of the way and off the floor.

Write for full details.

**The Western
Tool & Mfg. Co.**
Springfield, Ohio

THE NEW LINLEY



High Speed Vertical Milling Machine and Jig Borer.

Unsurpassed for small work. Has new direct reading micrometer screw feed quill. Makes accurate, quick cuts at any predetermined depth to 3".

Write today for
descriptive Circular B.

LINLEY BROTHERS CO.

11 Montauk St.,

Bridgeport, Conn.

should help welders and sheet metal workers in the laying out of any angle cut from 0° to 90° . It is said to be especially useful for odd angles, for which templates may not be available. The makers also declare that it definitely speeds up the making of templates.

Use of this "angle meter" makes it unnecessary to obtain the desired curve by means of projection. After drawing a center line and sixteen division marks, one needs only four measurements, which can be read directly from the angle meter. These measurements are used four times to plot the desired cross section.

The Wolfe Angle Meter measures any angle from 0° to 90° in steps of 1° on diameter from 1" to 20".

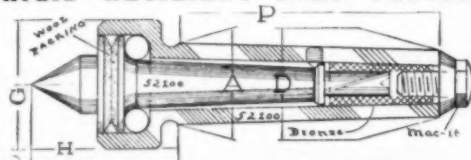
Spring Core Round Belting

Sudbury Laboratory, South Sudbury, Mass., offers an innovation in round belting. Round-TEX, as it is called, is built on a tightly wound steel spring as a base and covered alternately with rubber, braid, and rubber.

A Round-TEX belt is fastened with the aid of a small piece of rawhide around which the ends of the spring are threaded together. This smooth joint permits installation with a slight tension which is said to mark a definite advance in round belting performance.

Round-TEX is said to be applicable wherever round belting is used. It is asserted that Round-TEX may be substituted for V-belts in some cases on light drives.

RIGID RESILIENT BULL CENTER

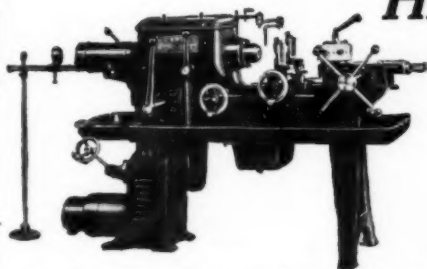


**Rigid Tool Company, 2,000 Witherell St.,
Detroit, Michigan**

THE Aeronautical Products Inc. Co. of Detroit agrees that they have used the Rigid Live Centers exclusively for years, and have never yet known one to be overloaded, while the same work from a dead center would have melted it. Therefore they are not comparable.

All Morse tapers carried in stock.

HERE IT IS!



The new SIMMONS No. 2 (1 1/4") Turret Screw Machine offered to you with three distinct advantages:

- Low Cost
- High Precision
- Quick Delivery

The SIMMONS Micro-Speed Drive, equipped with push-button control and magnetic brake, offers a range of spindle speeds up to 1,500 RPM. The operator can select the speed best-suited by a mere turn of a hand wheel.

Spindle mounted on Timken Precision Tapered Roller Bearings. Levers within immediate reach of operator. Head cast solid with bed, insuring rigidity.

Write to-day for complete details.

SIMMONS MACHINE TOOL CORP.

1725 Broadway, Albany, N. Y.

Singer Bldg., New York City

SPEED & PRECISION

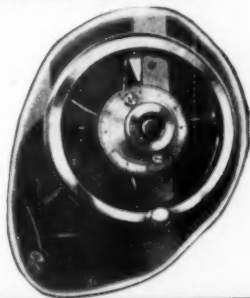
with

Grand Rapids Hydraulic Feed Surface Grinders

Patented Vertical Head Adjustment On Grand Rapids Grinders enables operators to keep limits well within0001".

Rigid one piece column and base which insures the rigidity and permanent alignment necessary for precision grinding.

Write for Catalog GL-100

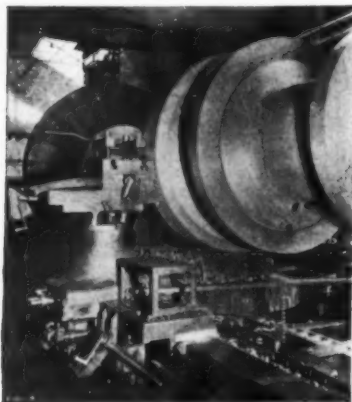


GALLMEYER & LIVINGSTON CO.

405 STRAIGHT AVE., S. W. • GRAND RAPIDS, MICHIGAN

"Rpm's per Grind"

In machining this giant G-E 183,000 lb. forged steel generator shaft, with diameters running up to 7 feet, tool life is a problem not of pieces but of inches of cut. With high speed steel tools, there would be a few thousandths wear every four or five inches of longitudinal travel—every 130 to 160 revolutions.



With the generator end of the shaft, alone, over 21 ft. long, frequent re-setting and grinding was involved. Recently, however, Carboloy tools have been adopted for such work and the entire length is now cut without a single grind—merely a simple hand-stoning of the tools once, in the machine.

Furthermore, the three single point tools—one straight turning tool, one left hand offset, and one right hand offset—reduced machining time to 95 hours by permitting stepping up of cutting speed from 30 to 90 ft. per minute. The shaft is of .40 carbon steel.

Checking Thermocouples

A new 28-page catalog lists everything needed to check thermocouple pyrometers. It not only illustrates and describes portable equipment for plant tests under actual operating conditions, but the laboratory apparatus to standardize it. Recommendations are also

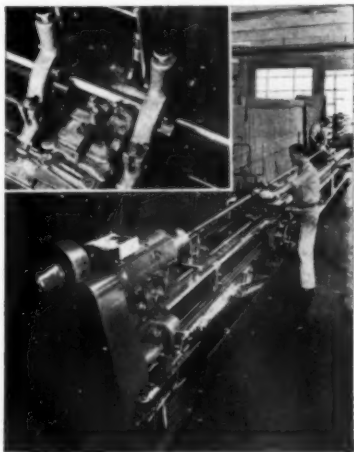
included so that pyrometer users should have little difficulty in choosing checking apparatus best suited to their needs.

A copy will be sent to anyone who asks Leeds and Northrup Co., 4934 Stenton Ave., Philadelphia, Pa., for catalog E-33A-503, "Apparatus For Checking Thermocouple Pyrometers."

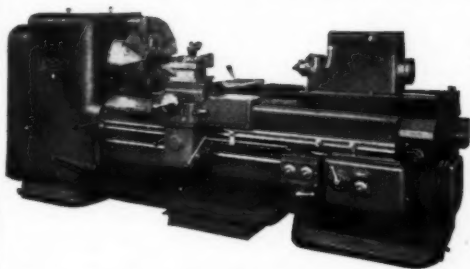
Chasing A 30 Foot Thread

At Monarch Machine Tool Co., Acme threads on lathe lead screws up to 188½" long are now finish chased with but a single tool grind, and yet maximum error is said to be held to within .0005 in. per 12" of lead, speeding up production of lead screws in line with increased lathe production demands for industrial and defense needs. Finishing time required is reported to be reduced 50%, the number of passes required also being reduced. "Secrets" of the success of the operation in holding to close tolerances and fine finish is the use of Carboloy tools (to hold a keener edge) and the provision of rigid tool rests close to the tool and traveling with it.

Material is X-1335 steel. Thread is .135" deep with 4 threads per inch. About .010" stock per thread flank is left for the finishing operation.



A Boon To Defense Production



MOREY 27" Manufacturing Lathes

fill an important place in the Defense Program in the turning of shells. These lathes are especially designed for single purpose operations.

Automatic Roughing Lathe

A special carriage carrying a front multiple tool holder and 2 adjustable cut-off tool holders in the rear, arranged with a complete hydraulic cycle is recommended. The front tools are fed into the work, then longitudinally until the shell is turned. Simultaneously the cut-off tools cut the shell to length. Upon completion, all tools are automatically withdrawn and returned to starting point.

Let us send you specifications and prices.

MOREY MACHINERY CO., INC.

410 BROOME ST.,

NEW YORK, N. Y.

*for more solid rivet
joints per*

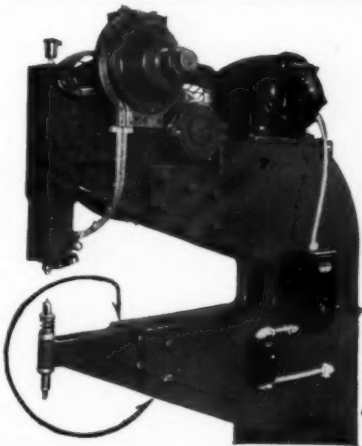
RIVITOR

(minimized change-over time)

Sustained production with but small loss of time for "change-overs" is possible with this "Interchangeable Horn type" Rivitor.

Complete horn sections, carrying the anvil mechanism, may be transferred to another Rivitor (this type) which has the required throat depth to get the next rivet locations.

This not only permits maximum machine utilization but also accommodates more automatic feed riveting without having to have additional complete machines. At the same time, the deep throat machines can be kept busy with work requiring that accommodation. Information on these and the other type Rivitors will be sent promptly; address **The Tomkins-Johnson Co., 605 N. Mechanic St., Jackson, Michigan.**



this is a **TOMKINS-JOHNSON** *product*

A New Portable Disc Electric Sander

The "American Speedy Spinner" is announced by the American Floor Surfacing Machine Co., 515 So. St. Clair St., Toledo, O. This portable electric sander employs a rubber disc, allowing its use on many curved surfaces which are difficult to surface with some other types of equipment.

A special feature of this versatile tool is its ready adaptability for boring and drilling operations with standard drills up to $\frac{1}{4}$ " for which a chuck is included. Also included is a paint mixer for freshening-up opened cans of paint.

The "Speedy Spinner" can be used for surfacing wood, metal, plastic, glass, and many other widely-used materials. It is remarkably light and compact, weighing only 5 lbs. 10 oz. Standard equipment embraces a wide range of accessories including lamb's wool and felt buffing pads. The buyer



may choose one of the following brushes: palmetto, basteen, Tampico, or wire.

MAKE SPRINGS

in a jiffy!



Patent No.
2052443

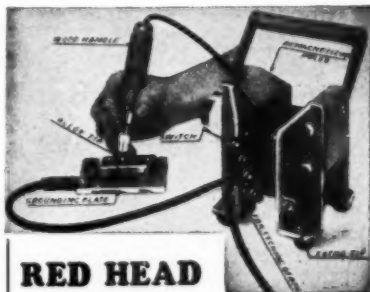
Write for your
Circular.

with
**Blaner
Universal
Hand
SPRING
WINDER**

Here's a profitable tool room unit. Quickly makes hundreds of sizes of springs. Sturdy, dependable... a real time and money-saver.

Illustrated is No. 4 Universal with adjusting shaft of $\frac{1}{8}$ " square. Takes wire up to $\frac{1}{4}$ " diam.

THE JOHN BLANER CO.
Corner Meek & Elm, Sharon, Pa.



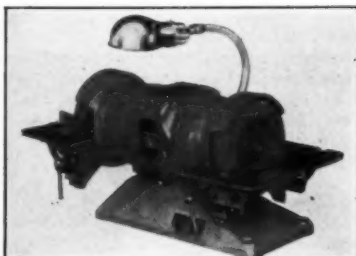
RED HEAD

ETCHERS and DEMAGNETIZERS

Let us tell you the many advantages of our new D. C. and A. C. models now available. Also, see our new line of Magnetic Parallels and Midget Chucks.

Send **TODAY** for latest circulars

PRINTZ ELECTRIC CO.
14595 KENTUCKY AVE.,
DETROIT, MICHIGAN



SPOTLIGHT the WORK

Get More Production

BALDOR ELECTRIC CO. of Saint Louis, Mo. use Vimcolights on their Carbide Tool Grinders. One light can be used for either wheel . . . a flexible, high intensity, non-glare light that *increases output per machine*. Let us solve your lighting problem.

VIMCOLIGHT

VIMCO MANUFACTURING CO.
109 CHERANGO ST. BUFFALO, N. Y.



NEW! CENTER GRINDER and DRILL PRESS

Two machines for the price of one! Easily changed from a Center Grinder which dresses angle accurately and assures accurate grinding to a sturdy, accurate Drill Press of 1/2-inch capacity. Floor type, any length, complete with motor, diamond and grinding wheel. Four speed V-belt drive.

\$197.50 Standard grinder, 40" between centers, complete with 110-220 volt motor
F.O.B. DETROIT
Write for Bulletin No. 11

DALZEN MANUFACTURING CO.
511 LEIB ST. DETROIT, MICHIGAN

LIMA GEARSHIFT DRIVE *Streamlined*



Any lathe or other machine tool operating on one to 25 H.P. can be brought up to full modern productive capacity by the LIMA Gearshift Motor Unit. Eliminates counter shafting and cone pulleys. Two models—drive for independent motor, and direct drive which has motor built in. Speed changed instantly by a flip of the convenient shift lever.

The LIMA Gearshift Drive is designed to give the manufacturer's recommended speeds on any machine tool. Any of the four forward speeds can be reversed instantly with a drum control.

AS LOW AS
\$67.50
LESS BRACKET

Equipped with hand wheel for rotation of machine spindle. All steel heat-treated gears run in bath of oil. Compact, streamlined design. Guaranteed one year. Write for specifications!

The LIMA ELECTRIC MOTOR Co.

414 N. MAIN ST., LIMA, OHIO

Builders of Dependable Industrial Motors of Every Type, 1/2 to 75 H. P.
New Streamlined Splatter-proof at Ordinary Open Motor Price.

Computing Change Gears in Gear Hobbers

A new 44-page booklet of special value to gear production men and engineers is announced by Michigan Tool Co., 7171 E. McNichols Road, Detroit. It presents in simple form, short cuts of practical every-day assistance to those whose work involves the cutting and checking of gears.

Included are Change-Gear formulae and tables for hobbing machines, for-

mulae and tables for checking gears by the ball method and pin method, a table on hobbing speeds, complete tables of decimal equivalents of fractions for use with the change gear formulae, etc., as well as hob-checking equipment information, and formulae for calculating hobbing time.

To make the book of most practical use, actual examples, applying the formulae are given in each case. With the new method of calculation evolved, set-up men should find it much easier than heretofore to perform all calculations required.

A limited number of the new booklets (Bulletin No. 270) are available for distribution free of charge to users of Miteco ground form gear cutting tools, "Michigan" gear production and "Sine-Line" gear checking equipment, as well as shop executives and engineers engaged in producing gears.

Accurate Hole Transfer Made Easy With NIELSEN TRANSFER SCREWS



Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 7 sizes U.S.S.—Inexpensive—last for years.

Write for Circular
NIELSEN TOOL & DIE COMPANY
1859 Gardner Ave.
Berkley, Mich.

MODEL NO. 16 "SPECIAL"

Constructed as per Specifications of
U. S. Naval Aircraft Factories

Reg. U. S.
Pat. Off.



BUTTERFLY FILING and SAWING MACHINE

(Die Making Machine)

This is a very heavy, powerful machine and is designed for extra heavy filing and sawing, but it performs small work just as well. This type of machine is usually

Beware of Imitations!
Our machine carries the
Butterfly trade mark.

adopted in Ammunition Plants, Airplane Factories and machine shops where heavy and precision filing and sawing is desired. We also manufacture smaller models—Model D-10⁸ Table; Model No. L—12⁸ Table.

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duty work.
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ball and roller
bearings assure
maximum capac-
ity for high speed
production and long
service.

NIELSEN, INC. LAWTON, MICH.

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**FOR GREATER DEMANDS BY INSTALLING
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DIE MAKING MACHINES**

They will save 50% to 60% of the labor over hand methods;

They will relieve the pressure in your Tool and Die departments;

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OLIVER INSTRUMENT CO., 1408 E. Maumee St., Adrian, Michigan

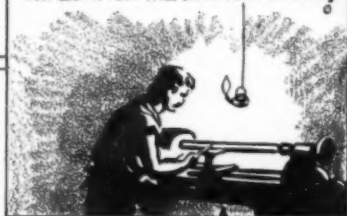
Mechanics Through the Ages

ACCORDING TO A CUSTOM
HANDLED DOWN THROUGH GENERATIONS, THE
ISLANDERS OF THE SOUTH SEAS STILL USE
PIECES OF CORAL, TORN FROM REEFS, FOR
THEIR FILES.



AS LATE

AS 1880, THE ONLY ILLUMINATION
USED IN MANY AMERICAN MACHINE
SHOPS WERE TIN TEAPOT-LIKE TORCHES
BURNING WHALE OIL, HUNG ON
WIRES OVER THE MACHINE TOOLS //



A 'FAR CRY' FROM THE MODERN MANDREL WAS THE CRUDE
TOOL OF THE 1870'S. THAT PIONEER MANDREL WAS SIMPLY A PIECE OF ROUND IRON
OR STEEL, PICKED OUT OF THE SCRAP HEAP, AND TURNED DOWN TO THE REQUIRED SIZE.

"Eye Maps"

Splinters of glass, metal or other foreign matter embedded in the eye, can now be located with X-ray "maps," made while the patient wears a special curved contact lens over the injured eyeball.

Dr. Raymond L. Pfeiffer, roentgenologist at the Eye Institute of Presbyterian Medical Center in New York, recently reported in the American Journal of Roentgenology that the new technique has proved the simplest and most effective ever discovered for this purpose. Westinghouse X-ray equipment for such uses is now available for doctors and hospitals throughout the country.

The contact lens has four lead dots on its surface. X-rays passing through the eyeball and the lens, reveal these dots as white spots on the negative. The foreign body then is charted by comparing its position on the film with the tiny white spots.

Two X-ray pictures are taken, the first showing a frontal view of the injured eye, and the second with the patient's face in profile. The side view reveals the depth to which the splinter or foreign matter has penetrated.

The new X-ray device is an "L"



GAGING PRECISION by Touch is only Approximation compared to VISION.

The sense of feeling or of touch as applied to fixed gages when used to determine the accuracy of specified sizes on machine parts, depends upon the sensitivity of the inspector and varies with each individual.

But, a visible indicating hand, moving over widely spaced dial graduations, is something which can be seen with the same degree of accuracy by anybody.

This fact is one of the strongest reasons for using Dial Indicators even for comparatively large tolerances. Send for catalog.

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FEDERAL

PRECISION MEASURING INSTRUMENTS

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shaped head rest which holds the X-ray film. Frontal views of the eye are made by placing the X-ray tube on a horizontal plane and aiming it at the back of the patient's head from a distance of three feet. For profile views, the X-ray tube is suspended over the patient's head and pointed downward. Lines are drawn on the completed picture to show the relationship of the foreign body to the four lead dots. These measurements are then transferred to the prepared eye map.

Obsolete Equipment

By W. F. SCHAPHORST, M. E.

ENTIRELY too much obsolete equipment is in service today—equipment that should be scrapped. We commonly junk our automobiles as soon as they are out-of-date. Usually they are not even obsolete when discarded. We just don't like the "looks" of "the old car," so buy a new one.

Is that good business? Why do we persist in operating obsolete equipment in our industries, and at the same time demand strictly up-to-date pleasure equipment? To scrap worn or obsolete industrial machinery Pays, while the purchasing of new machinery every year, to play with, does Not pay.

That inspires the question:—"When does a machine become obsolete?" So far as I know there is no rule or formula that positively answers this important question.

To be sure, you as an automobile owner may insist that your car becomes obsolete in one year and therefore trade it in for a new one annually. But, your "old" car still continues to run for a number of years in the hands of subsequent owners. Whether or not your automobile really is obsolete is therefore largely your own personal whim.

In many modern plants, engines, turbines, and other items of equipment are discarded as "junk" after being in service only 10 years. They are replaced by more efficient and more economical apparatus. In other less progressive plants, such equipment is kept another 10 years or more.

You and I have our own ideas about obsolete clothes and when they should be replaced. The average man "wears out" one straw hat and one felt hat each year. Women "wear out" hats more rapidly than men. Some people use lead pencils until they are "stubs." Others discard them as soon as they are inconveniently short.

But let us get down to brass tacks. What we are looking for is a good rule or formula. My own answer to the question is this:—A thing is obsolete as soon as it is found that it will pay to replace it.

Sometimes it pays to throw out machines that are new. I was once employed by a concern that manufactured a decidedly inefficient machine. I didn't know it was inefficient and uneconomical at the time or I would not have worked for them. They were in business for three years and then were forced to quit because nobody would buy. Many of their machines were replaced inside of a year because they actually were obsolete before they were installed. They were "new," yes, but obsolete nevertheless because it paid the purchasers to install something better immediately.

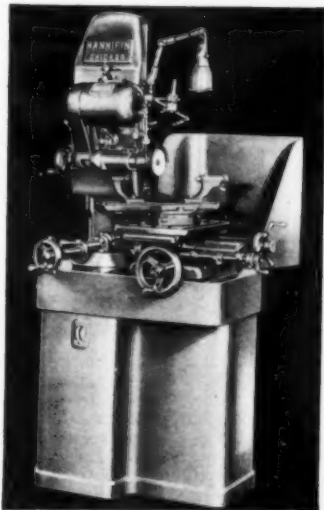
Simply because we can "get along" with an old machine, part, or thing, is no proof that it is not already obsolete. My contention is that entirely too much machinery is in daily use that should be in the scrap heap. It should be replaced because it will PAY to replace it.

Felters Oil Seal Booklet

The Felters Co., Inc., 210 South St., Boston, Mass., offer a booklet entitled:—"Felts for Sealing and Lubricating Bearings." This booklet is designed to tell engineers about the different uses to which Felters' Certified Felts can be put and their superior features. It also was designed to aid the engineer in selecting the type felt or felt combination which can be put to his particular use. In other words, if an engineer feels that felt can be adapted to his use for sealing or lubricating oils or grease, this booklet will be very valuable to him, whether it be plain Certified Felt or Dufelt.

A Universal Tool Grinder

A Midwestern manufacturer offers a new universal precision tool grinder. This grinder is reported to sharpen cutting tools quickly yet with an unusually high degree of accuracy. In addition, this machine can be used to grind many types of grinding fixtures, gages, dies, etc.



The No. 5 as it is called, features a "super-precision" spindle. The spindle ball bearings are said to receive proper lubrication at all times by means of the lubrication system. The spindle is driven by a balanced, heavy duty, $\frac{3}{4}$ h.p., ball bearing motor, with built-in air filter and forced ventilation system. Drive is through an endless herringbone weave belt. Interchangeable pulleys provide for ten speed speeds ranging from 3600 to 35,000 r. p. m. under load.

A coolant pump is built-in, driven by a separate motor. The table has a working surface 9" x 13".

Three fixtures are included with this grinder as standard equipment. They are:—plain angle wheel dresser, sub-



How To STOP RUNAWAY COSTS CUT FASTER LAST LONGER

Are you being pushed to get out more work? Let Capewell hack saw blades give you a lift.

They save time by cutting with fewer strokes . . . save money by lasting longer . . . save labor (on subsequent operations) by cutting with precision.

See for yourself what Capewell hack saw blades will do on your own jobs.

We let you be the judge. Order a trial lot from your jobber today.

THE CAPEWELL MFG. CO.
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CAPEWELL
HACK SAW BLADES



table for centers, centers and locating finger. Many other attachments are available at extra cost, such as:—radius and angle wheel dresser, spiral grinding fixture, universal vise, etc.

Electric Motorized Transmission Control

A Midwestern manufacturer announces a new series of transmissions equipped with electric motorized control.

These new models supplement the standard line from fractional to $7\frac{1}{2}$ h.p. capacity that are equipped with lever type and hand wheel control. The electric control is especially recommended where the drive must be mounted on the ceiling, back of or inside the equipment.

SAVE TIME CUT COSTS

with

MOTO-TOOL

★

27,000 R. P. M.

At this high speed, Dremel MOTO-TOOL reduces cost of wheels, points, etc., on grinding, buffing, finishing and other daily shop operations. An indispensable tool for pattern shops, tool rooms and production departments. Ideal for exacting work in hard-to-get-at places . . . often saves time of tearing down and re-setting dies. Pays for itself on first job in many cases.

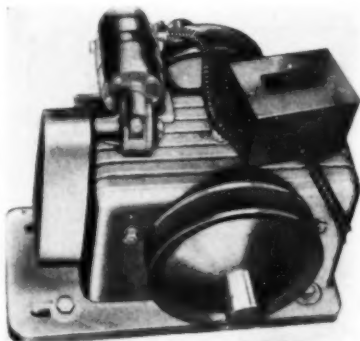
MOTO-TOOL is precision built for precision work. Has full bakelite shock-proof housing, oil-less (oil-sealed) bearings and built-in cooling fan. Weighs only 13 oz. Balanced armature eliminates vibration. Operates on either AC or DC 110-12 volt current. Sold by better dealers everywhere. Write for Dremel catalog and combination offers.

DREMEL MFG. CO., Dept. 211-B, Racine, Wis.



MASTER
MODEL 2

ONLY \$16.50



A two button switch controls the speed. Changes in speed adjustments are easily made, simply by pushing and holding either the fast or slow button until the desired speed is obtained. Changes in speed may be made in infinitely small increments throughout the complete range.

This electric motorized control is offered on variable speed transmissions of sizes from $1\frac{1}{2}$ to $7\frac{1}{2}$ horsepower capacity.

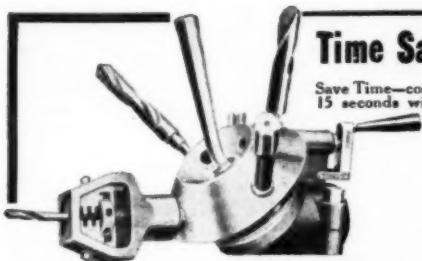
"PENCILPOINT" DIAMONDS

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This is one of our specialties for light work. No resetting of diamond is required. \$1.50 each; \$1.20 each in lots of 10; any size of steel shank. Discounts in quantities.

F. F. GILMORE & CO., 122 Dartmouth St., Boston, Mass.



Time Saved is Money Earned

Save Time—convert your present lathe into a turret lathe in 15 seconds with this rotary Tool Post Turret. Five tools automatically center when brought into play. Three sizes. Immediate delivery.

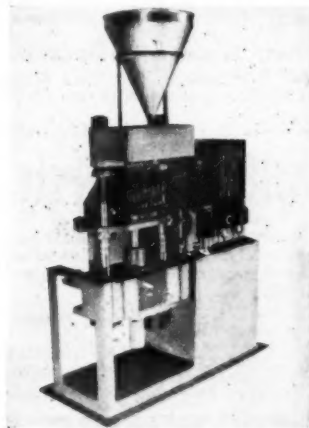
Free bulletins on our other time saving tools are awaiting your request.

Jefferson Machine Tool Co.

700 W. Fourth St., Cincinnati, O.

An Automatic Molding Press

The Cropp Engineering Co., Warren, Pa., announces a completely automatic press for molding plastics. This twelve ton press has a maximum piece size of 2½" x 8" x 5".

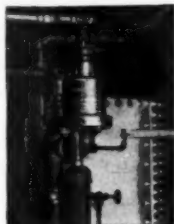


The manufacturers emphasize that this machine requires no attendant after it has been set up and started. If anything should go wrong, it shuts off automatically and rings a bell for the foreman.

It is suggested that many manufacturers will find it advantageous to adopt the automatic molding of plastics.

END STEAM BLISTERS SAND BLAST PUTTYING WATER LOGGED VALVES

Water in your air lines runs up maintenance costs, spoils sprayed finishes, corrodes internal parts. You can have clean, dry air at low cost with an Aridifier—cleans and dries air by centrifugal force. No baffles, screens or filters; nothing to clean out or replace. Thousands in use. Easy to install. For ¾" to 10" lines. Quickly return their cost.



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Try before you buy—see what it will save for you—30 days free trial.

LOGAN ENGINEERING CO.

4916 Lawrence Ave., Chicago, Ill.

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The **ARIDIFIER**
Dries and Cleans Compressed Air

"Hy-Draulic" Shapers

The Rockford Machine Tool Co., Rockford, Ill., offer a bulletin on their "Hy-Draulic" shapers. These 16", 20", 24", and 28" machines are described in great detail. There is also detailed material comparing hydraulic drive with mechanical drive as to cutting speed and pressure, rapid return, etc.

This folder also refers to other sizes of "Hy-Draulic" shapers, and to similarly driven slotters planers and shaper-planers.

Deep Throated Toggle Pliers

New rapid action Toggle Pliers with a 1-1/2" x 3" throat capacity, identified as model No. 450, are announced by Knu - Vise, Inc., 16841 Hamilton, Detroit. This extra depth of throat permits work being held several inches from the edge of the sheet or board.

Made from a 10/20 S.A.E forging, they are hardened and tempered, having a pressure ratio of 93 to 1.

Toggle Pliers are not bolted or welded to a fixture, but are manually applied simply by squeezing the handles—automatically locking in position and holding positively, but releasing instantly when desired. It is asserted that they will not walk or creep and they are quickly adjustable to accommodate different thicknesses by means of a small screw in the upper jaw.



The Knu-Sine line comprises 52 models of clamps and pliers adjusted basically for use as a Cee-Clamp for holding two pieces of material in close contact, or in position when welding, reaming, drilling and assembling.

New Kempsmith Bulletins

The Kempsmith Mfg. Co., Milwaukee, Wis., announce bulletins on their

Shear it Cleverly with a Beverly

Are you looking for a practical Shear? Investigate these efficient Beverly Bench Type Shears including one for heavy duty. Cuts metal sheets flatly of various gages into hundreds of shapes and designs. For the Shear most convenient to your purpose note the following models—

Made in 3 Sizes

- No. 1—cuts 14 gage—wt. 16 1/2 lbs.
- No. 2—cuts 10 gage—wt. 33 lbs.
- No. 3—cuts 3/16 inch—wt. 55 lbs.

**INCREASE YOUR PROFITS
WITH A BEVERLY**

**WRITE TODAY FOR
DESCRIPTIVE CIRCULAR.**

**The Beverly
Shear Co.**

**3005 W. 110th PLACE,
CHICAGO, ILLINOIS.**



milling machines. One folder describes Kempsmith cone type millers, which are offered in both plain and universal types. Also available is a leaflet concerning a motor drive which is especially designed for Kempsmith cone type milling machines.

They also offer a descriptive folder on their "Type G" all geared, motor-driven milling machines. These millers are available either plain or universal in two slightly different sizes.

Whitney Offers New Bench Punch

A new No. 17 Bench Punch has been developed by the Whitney Metal Tool Co., 115 Forbes St., Rockford Ill.

It is a powerful, roller bearing, deep throat punch. Made from fabricated steel plate, it is equipped with side and depth gauges. Capacity is $\frac{1}{4}$ " through $\frac{1}{4}$ " iron; depth of throat, $6\frac{1}{2}$ "; height of throat, $1\frac{1}{8}$ "; weight, 38 lbs.

Tool is furnished with three punches and dies— $7/32$ ", $9/32$ ", and $11/32$ ", unless otherwise specified. Stock sizes are from $1/8$ " to $17/32$ " by 32d's.



The Company is equipped to build almost any kind of special punch frame that may be required. Readers with punch problems that require special punch frames are invited to mail them a sample of the work or a drawing.

SPOT



WELDERS

Floor Models 10—35 KVA

Bench Models $2\frac{1}{2}$ —10 KVA

220—440 Volts

**MAXIMUM PRODUCTION
SIMPLICITY OF OPERATION
POWER ECONOMY**

Standard and Underwriters
Label Machines

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Only Manufacturers of the Dyer Welder



The Topeka Foundry and Iron Works Co.

INCORPORATED

300-322 Jackson Street

Topeka, Kansas

Simmons Micro-Speed Lathes

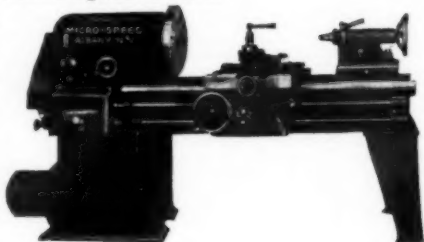
Attractive, heavy duty lathes in the 16" and 18" sizes, featuring Micro-Speed drives are offered by Simmons Machine Tool Corp., 1725 Broadway, Albany, N. Y.

An infinite range of spindle speeds is provided, without gears or clutches, permitting speed selections to suit a wide variety of jobs—under finger-tip control.

Additional highlights include Timken precision spindle bearings; snap levers for apron feeds; motor in cabinet leg; smooth belt drive to spindle.

Lathe bed is of semi-steel. Heavy side walls with double walled cross girts assure rigidity. Gears in quick change gear box, quadrant, end gearing, apron and all feed mechanisms are accurately cut from forged steel blanks.

Separate lead screw and feed rod are provided to preserve accuracy of screw which is in use only in cutting threads.



In the 16 size, swing over ways is 17"; over carriage 11"; over compound rest 10". Distance between centers is 30". Hole through spindle is 2". Ratio, 1st back gear, 4.4:1. Ratio, 2d back gear, 11.07:1. Number of thread changes, gear box, 36. Range of threads, U.S.S., 2 to 40. Range of metric threads, 1 to 20. Range of feeds, .0116" to .232". Lead screw threads per inch, 4. Tailstock spindle traverse, 7½". Travel of compound rest, 6¼". Steady rest capacity, 6".

AIRMGLO

Manufacturers of Resistance Welders—Foot, Motor, Air and Hydraulic operated.

Standard and for specific applications with and without electric timing control.

Bench type filing and sawing machines and abrasive band finishing machines.

ARMGLO COMPANY

Milwaukee, Wisconsin

Pneumatic Tool Catalog

Eight new pneumatic tools, the latest contribution of Thor engineers to industry, are featured in the No. 52 Pneumatic Tool Catalog, 1941 edition, now ready for distribution, announces the Independent Pneumatic Tool Co., 612 W. Jackson Blvd., Chicago, Ill.

These new tools consist of:—right angle and close corner drills, right angle nut setters and screw drivers, bolt wrenches, grinders, chipping hammers, sanders and saws.

Striking in appearance, the new 52 catalog is fully illustrated by tool and action pictures and gives complete specifications on the entire line of Thor pneumatic tools and accessories, including:—Rotary and piston air drills; close corner drills; wood boring machines; wrenches and heavy tube rollers; rotary brushes; grinders; nut setters; screw drivers and tappers; core and rivet busters; chipping, riveting,

scaling and staybolt hammers; balancers; motor hoists; holders-on; bench and floor rammers; rivet sets; rivet squeezers; sanders and saws; grinding, sanding, riveting and other accessories.

Precision Grinding Bulletin

Precision grinding plays an important part in the tooling and manufacturing operations which are part of the rearmament program. That's why readers should be interested in a booklet just published by The Dumore Co., Racine, Wis., entitled "The Care and Operation of Portable Precision Lathe Grinders."

This 14-page booklet gives a general description of the grinding processes, some of the problems of precision grinding, and some of the typical money-saving grinding setups that can be put to good advantage in the average shop.

Western Drive Mountings

A multi motor mounting which provides for individual motor installation on all types of used machine tools is announced by Western Mfg Co., 3404 Scotten Ave., Detroit, Mich.

It accommodates all NEMA frames Nos. 204 to 326 (1-15 h.p. at 1800 r.p.m.), including many Canadian, British, South American, and European motors together with older and special motors up to 10 h.p. used in the U. S. No extra plates or rails are necessary and it is asserted that motor installation time is reduced to a minimum. Provision has been made for the

take-up of Vee belts between motor and transmission.

Precision Welding Gauge

The Chicago Tool & Engineering Co., 8365 S. Chicago Ave., Chicago, Ill., announces a new welding gauge for accurate calibration of butt and fillet type welds.

The instrument is of convenient pocket size, and easy to operate. A simple adjustment gives an accurate reading to determine size of convex fillet welds. To check permissible tolerances of convexity, simply take reading at specified angle. With a similar application of the instrument, welder can determine the exact size of concave fillet welds. Butt weld reinforcements can also be checked with accuracy. The instrument is precision-built of chromium plated steel with dimensional readings clearly indicated. It is known as The Precision Welding Gauge, and it conforms to specifications of the American Welding Society.

SCHAUER Speed Lathes

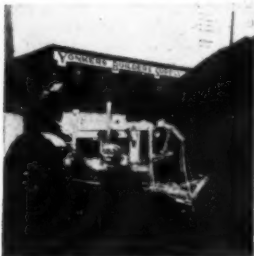


For
Finishing
Lapping
Polishing
small parts

Production necessities; timesavers. Specially designed to handle finishing operations more speedily and at lower cost.

Write for
NEW circular 400.

SCHAUER 2064 Reading Road, Cincinnati, Ohio



1941

SILVER KING BULLDOZERS

Reduce your fuel Handling costs with a Silver King Bulldozer Unit. It combines fuel economy at one gallon per hour moving 35 tons of coal per hour.

Bulldozer Plow is equipped with hydraulic lift and full safety devices.

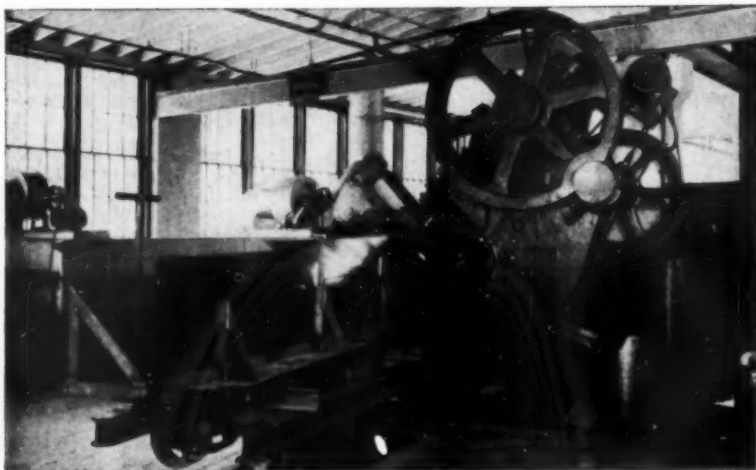
Same tractor can be used for other various jobs around your plant. A demonstration can be conveniently arranged.

CULLMAN SALES CO.

154 Nassau St.,

New York City, N. Y.

Speeding Punch Press Operation



New hand trucks have been built specially to handle the 10-ft. sheets of electric steel from which a.c. and d.c. motor laminations are punched in the Reliance Electric plant.

Each truck will carry three tons of sheet at a time, piled on a surface with a slope that matches the angle of tilt of the press plate. This eliminates need for any additional positioning of the sheets as they are fed between the blanking dies.

A combination air-hydraulic lift, over which the loaded truck is run beside the press, is used to elevate the sheets to exactly the right working level.

The lower edges of the sheets rest against angle iron uprights over which are fitted freely-sliding sheet guides containing hardened vertical steel rolls. Preparatory to starting the blanking operations, the operator frees the top sheet by pulling it toward him and then letting it slide back against the guides. These meanwhile, have dropped tightly against the surface of the remaining sheets.

The top sheet, sliding onto knife-edge projections on the guides, has its lower edge raised slightly above the rest of the sheets and its upper edge offset a couple of inches beyond the edge of the sheet pile. The decreased area left in contact with the sheet below, and the better hold provided by the projecting edge of the top sheet, serve to facilitate the operator's manipulation of the material from the truck through the press.

Previous practice has been to shear the sheets, approximately 10 ft. by 3 ft. in size, into 3 ft. by 1-ft. sections; feed these into the press from two-foot high piles. The use of the specially-designed trucks has permitted revising the procedure to considerable advantage. For the same size blanks, the 10-ft. sheets are slit into three strips of equal width. These are loaded onto the truck, elevated beside the press as shown in the accompanying illustration, and fed into it from the same height piles. The same number of blanks are obtained with the new method of cutting the sheet; but with a

reduction in the number of major handlings from nine to three, the handling time that is saved amounts to approximately 50 per cent.

Multi-Cut Lathes

Designed to serve the needs of an active and growing industry, two new Multi-Cut Lathes are announced in 6" and 9" sizes.

Both lathes are made for easy set-up of separate tools for turning, facing, necking, and grooving cuts. All go through their cycles and finish at the same time. Operation is automatic from the time work is put into the lathe, lead tool brought up to the work, and power and feed lever thrown into action. At end of the cycle of cuts, the hand-wheel is used to return the tools ready for the next part to be turned.

The variation in feed for the turning and facing sides is obtained by change gears applied to the feed bracket and worm box. The feeds read in "thousandths per revolution of spindle."

A simple, direct-reading, work diagram shows the change gear combinations and resulting feeds. The relationship between the slides is quickly adjusted by setting of the movable profile swivel plate. As the facing or forming tools approach end of the cut, the feed is retarded and stops as the roller slides on the land of the profile guide plate.

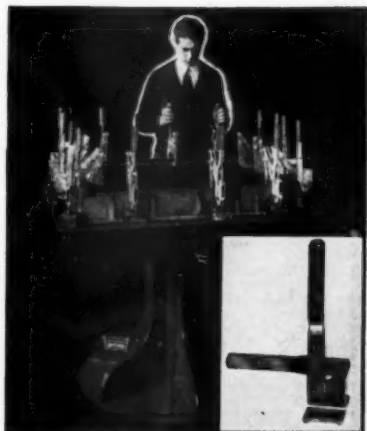
It is emphasized that no expensive tooling is necessary. The set-up is simple. And the machining cycle is accomplished by many tools cutting simultaneously.

By this method, the time required for the longest individual cut turning or facing depends upon the machining time for the piece.

Milling Cutter Grinding Manual

A complete shop manual on grinding practice in connection with cemented carbide type face mills and end-cutting tools is offered by Carboloy Co., Inc., 11139 E.-8 Mile Road.

The booklet (No. GT-127) comprises 20 pages, and is accompanied by two 21" by 15½" charts illustrating the



*. . . with hinged
or fixed base . . .*

Illustration shows toggle clamps used in gun welding fixture for a Crosley refrigerator door panel. This model may be supplied as illustrated with either fixed or hinged base. Knu-Vise clamps are standard equipment with most of the aircraft, automobile, and accessory plants throughout the United States. Only Knu-Vise Toggle Clamps have the Universal action hinged base, cam activated pressure, Tomington Needle Bearings and other improved features.

The complete line of toggle action tools—52 varied models—are available for immediate delivery.

Send for catalog. Celluloid templates available at \$1.00 each.

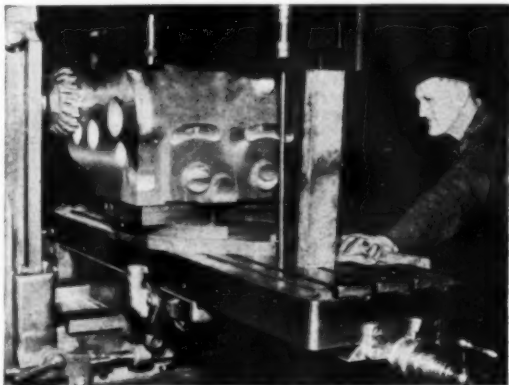
KNU-VISE, INC.

16841 Hamilton Ave., DETROIT, MICH.

complete grinding procedure. It covers every variable involved, from selection of grinding wheel type, shape, grade and speed to recommended tooth profiles for different purposes and different forms of milling cutters and end-cutting tools.

The manual takes into account the various types of tool grinders on the market, illustrating the method to be pursued on each type to obtain the best performance with the various cutters.

Manufacture of standard machine tools for defense purposes has been put on a mass production basis in many plants in recent months—using many a trick from mass-production industries to step up output. Here, a headstock for a Monarch lathe is being milled at 250 ft. cutting speed per minute, instead of the usual 90 ft., through the use of high-production cemented carbide milling cutters. Similar cutters are used for many of the milling operations at Monarch, now. (Photo—Courtesy—Carbology.)



SHELDON

Back Geared Screw Cutting Precision Lathes



Meet new production demands with new 11' and 12' Sheldon Precision Lathes. Though moderate in price, they are quality machine tools, precision tools with modern features.

The U-1236 WQ (illustrated) comes with 4-speed anti-friction lever-operated, Pedestal Motor Drive. Full Quick Change Gear Box; Large Special Analysis Steel Spindles that are ground *all-over*, inside and out—even the spindle nose thread is ground; Precision Preloaded Ball or Roller Spindle Bearings, Double Walled Worm Feed Apron with Power Cross Feed and other quality features. Sheldon lathe beds are semi-steel with hand scraped ways, 2-V ways and 2 flat ways.

Write for Catalog

SHELDON MACHINE CO., Inc.

1629 N. KILBOURN AVE. - CHICAGO, U. S. A.

Handy End Mill Grinder

A new end mill grinder has been developed to speed shop production and to prevent tie-ups of regular tool grinders. This compact device, weighing only eight pounds and measuring no more than 5" x 7" will, the manufacturer asserts, grind an end mill in five minutes—as compared with perhaps 30 minutes when an ordinary tool grinder is used. The grinding wheel slips into the chuck of any high-speed drill press—converting it into a tool grinder at small cost. It is said to be unnecessary to employ a highly skilled tool man for the job job.



The fixture, which takes single or double end mills, straight or tapered shanks, right or left-hand, grinds mills up to one inch shank diameter. It is equipped with a precision-made arbor that fits a $\frac{3}{8}$ " capacity drill press chuck. It will hold end mills of any size up to a B. & S. No. 9, and also grinds hollow mills, counterbores, and other facing tools.

The fixture has a movable V-block with a $\frac{3}{8}$ " movement, regulated by a fine-threaded thumb screw for delicate adjustment, with both bottom stop and



More

✓ VISION

✓ PROTECTION

✓ COMFORT

SELLSTROM EYE PROTECTORS

The complete line of Sellstrom comprises every type of goggle, face shield and helmet necessary for industrial needs. Every item has been designed to provide the maximum in vision and yet give reliable protection with comfort to the wearer.

The illustration above shows our general all-purpose industrial goggle Series 3000 which affords efficient eye-protection, comfort and wide angle vision all in one. The frame is constructed entirely of metal with rocking nose pads of pearloid which will adjust themselves to the sides of the nose, fibre covered temples that are heat and perspiration proof and folding side shields. Can be equipped with any type of industrial lens.

- No. 3000 FC Without Side Shields
- No. 3001 FC Leather Side Shield
- No. 3002 FC Wire Mesh Side Shield
- No. 3003 FC Green Acetate Side Shield.

Write on your letterhead for a pair of these 3000 Series goggles for test purposes and a catalog showing our complete line.

SELLSTROM MANUFACTURING CO.

646 N. Aberdeen St. Chicago, Illinois

Undoubted Value

in



CHROME PLATED GAGE BLOCKS

the only remaining question

ACCURACY?

AND WE HAVE IT !
in the degree required

A perfect combination — the
virtues of CHROME PLATE
plus the accuracy you need.



DEARBORN GAGE COMPANY

*"Originators of Chromium Plated
Gage Blocks"*

22035 Beech Street

DEARBORN - MICHIGAN

spring-finger stop fixed to this block. In addition, the fixture is equipped with a leveling screw which enables the operator to grind a straight face on an end mill when so desired.



A sturdy grinding wheel for use on high-speed steel comes with the fixture, along with a special wheel holder for keeping the wheel conveniently handy when not in use.

Stainless Steel Engine Mountings

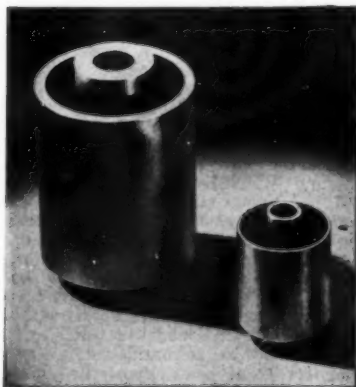
A new line of low cost aircraft engine and cowl mountings of high capacity load rating which employ Neoprene, for resistance to oil and ozonal attack at high altitudes, and 18-8 stainless steel for resistance to the corrosive effects of salt air at low altitudes is announced.

While originally designed for aircraft use, the mountings are also available for industrial applications where operating conditions require both Neoprene and stainless.

The unique method of manufacturing these mountings which provides a mechanical rather than a chemical bond between the Neoprene and stainless steel permits their use in such a combination for the first time, it is believed. Capacity rating is approxi-

mately 150 lbs., per square inch axial load. The process also permits the manufacture of special sizes or small quantities at low cost.

Since there is no chemical bond between the Neoprene and the steel (an impossibility anyway, it is said), the bushings combine the two best features of these materials for the first time. Thus, the mountings are not only resistant to the action of ozone and salt air but also to oil—all three being prime considerations in the selection of engine mounts for seaplanes.



The process of manufacture consists essentially of stretching a tube of seamless Neoprene between inner and outer tubes of stainless steel and then permitting the Neoprene to seek its initial state. The force exerted by the Neoprene to attain its original position provides sufficient pressure to form a high-capacity mechanical bond between the Neoprene and both inner and outer stainless steel tubes.

The larger mounting shown in the illustration is for the engine while the smaller is for the cowl. The engine mounting measures 2-5/8" long by 1-3/4" o. d.; rubber wall is 7/8" i. d. x 1 1/2" o. d. Dimensions of the cowl mounting are: — 1-1/2" length o. a.; rubber wall has a 3/8" i. d. x 7/8" o. d.

Immediate Delivery of These DIAMOND DRESSERS



Carboloy Diamond Dressers are in stock ready for immediate delivery in five most commonly used types of holders.*

You get this prompt service plus these time saving, cost saving features:

No resetting—No lost diamonds—90% diamond utilization—Use on same size wheel throughout life—Uniform price—Uniform quality—Stands unusual abuse—Saves at least 25% in annual dresser cost.

Carboloy dressers contain a multitude of diamonds impregnated throughout a special, hard Carboloy matrix. New cutting surfaces provided by simple 2-minute resharpener operation whenever needed. Complete ordering data below.

Not just one but many diamonds are permanently mounted in hard matrix.

CARBOLLOY COMPANY, INC.

11139 E. Eight Mile Ave.,

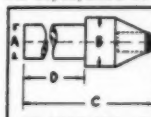
Detroit, Michigan

Chicago, Cleveland, Los Angeles,
Newark, Philadelphia, Pittsburgh,
Worcester, Mass.

HOW TO
ORDER

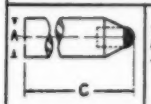
Grinding Wheel		Correct Dresser	Price Each
Diameter	Width		
Up to 20"	Up to 1 1/4"	2-B	\$ 9.60
Up to 26"	Up to 2 1/2"	3-C	12.60
Up to 42"	Up to 8"	4-D	15.35

*Mounted Free in Desired Holder. Standard Holders shown below. Special Types when needed. Allow 1 Week—10 days for holders No. 37, 38, and S-16-A.

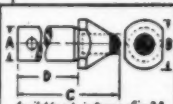


HOLDERS NO. 36 or 37

Hold- er	A	B	C	D
2	1 1/2"	1 1/2"	1 1/2"	1 1/2"
3	2 1/2"	2 1/2"	2 1/2"	2 1/2"
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5	4 1/2"	4 1/2"	4 1/2"	4 1/2"
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100	99 1/2"	99 1/2"	99 1/2"	99 1/2"



HOLDERS 1, 2, 3, 4, 36



Holder Type NPS-16A

CARBOLLOY Diamond Impregnated
WHEEL DRESSERS

TAMMS

BLUE LAYOUT DOPE

For tool and die-makers liquid form ready for immediate use! Quick drying—non-rubbing. A scribe shows a clear distinct line without chipping or scraping off. Tamms Blue Chalk for checking leaks in castings. Write for FREE SAMPLE!

TAMMS PYRAMID

PORTABLE Surface Type PYROMETERS

and instruments for heat testing!

Get Catalog NOW.

Foundry Division
228 N. LASALLE STREET,
CHICAGO, ILLINOIS.

TAMMS SILICA CO.
CHICAGO, ILLINOIS.

Defending America

American industry, in its job of building armaments that will protect the American way of life, is "fighting this war for America at the lathe," Clifford S. Stilwell Vice-President of the Warner & Swasey Co. recently asserted.

"Granted that all our social reforms are commendable and granted the day may come when we shall insure their permanent establishment, of what value are they if we fail in the present emergency?" Mr. Stilwell inquired. "This war for America is being fought at the lathe."

"I am persuaded that no problem of the supply and training of men now or in the future is so difficult or so serious as the confusion of understanding of common interests which dampens the highest degree of productive efficiency now," Mr. Stilwell added in the form of a warning. "Only casual familiarity with the chaotic spirit of French labor in her time of peril is necessary to realize what must be accomplished. France faced this problem and failed. England faced this problem and the answer was forced upon her by circumstances too late to make her safety certain. America now faces it, but the questionable security of ocean barriers still leaves it unanswered."

"Despite the innuendoes of our current political philosophy there still persists a wholesome degree of idealism in American business management. I am utterly convinced that there can be brought about, under a fair and equitable policy of management, a clear understanding as between employee and employer, that the present threat from

without our domestic family leaves but one common objective to us all."

Speaking directly for his own machine tool industry, on which the success of our national defense program so directly depends, Mr. Stilwell analyzed the situation as follows:

"The problem of expansion has been difficult for lack of any apparent ability of anyone thus far to reveal to the industry a specific tabulation of requirements for the completion of our national defense project. We cannot tell just what types of machine tools must be produced, or in what quantities. Up to this point, the entire procedure has been one of guessing rather than factual analysis and is the result of judgments from personal observations made in Europe of the crucial situations arising from a failure to bring forward machine tool capacity more rapidly in England and France."

"Granted however, that the inevitable and involved processes of tooling and production planning are provided for, there is now increasing evidence that the machine tool industry is demonstrating its ability to meet the requirements placed upon it. If and when our national defense program will produce a schedule of its actual requirements in machine tools, that schedule will be accomplished."

"There is no question of the ability of American industry to protect our American way of life. We have a job to do together, and it must be done quickly."

Piston Ring Bulletin

Types of automobile piston rings used to restore performance in cars with various cylinder wear conditions are explained in a leaflet recently published by Koppers Co., American Hammered Piston Ring Division, Pittsburgh.

Different combinations of specialized compression and oil rings are recommended for varying degrees of cylinder wear, with and without re-boring the cylinders.

Illustrated, too, is the operation of a (Koetherizer) machine that corrects piston slap by resizing pistons to their original diameter.

Gear Tooth Drive Disc Clutches

A new Bulletin, MGT, presents Conway Gear Tooth Drive Disc Clutches in the 8", 10", and 12" or B, C, and E sizes.

These clutches are asserted to have provided the very last note for the trends in modern manufacture, for the severe shocks of stepped up production, for the balance, smooth functioning, rugged reliability of tomorrow's needs. The units are lighter, the speeds are faster, the work is harder, the clutches must be sturdier.

Clutches are shown complete with adapters, and also as mechanisms only, without adapters. They can be furnished in the single, tandem and triple plate types and equipped with ball bearings.

Address Conway Clutch Co., 1541 Queen City Ave., Cincinnati.

Fastening Devices

A revised schedule of prevailing discounts on fastening devices such as bolts, nuts, screws, washers, etc., is available to users of such merchandise.

Much valuable data including items in stock, f. o. b. points, plating information, delivery time, specials, terms, as well as many new discounts and a complete commodity index is compiled on one side of this handy sheet, enabling a busy buyer to hang the schedule on the wall or place it under the glass on his desk and thereby have all necessary information conveniently at hand for ready reference.

This discount schedule (No. 42) as well as the 40 page Stronghold catalog of fastening devices is available from Manufacturers Screw Products, 216-222 West Hubbard St., Chicago, Ill.

Reznor Unit Heater Catalog

The new line of Reznor gas-fired unit heaters, which includes fan type, blower type and duct type units, described in Catalog U41 recently issued by the Reznor Manufacturing Co., 141 James St., Mercer, Pa. Each type of unit is available in five different capacities ranging from an input of 55,000 btu per hour to an input of 200,000 btu per hour.

PREVENT MISTAKES REDUCE SET-UP TIME



IDEAL

**"Universal"
METAL
ETCHER**



- Permanently marks on steel, iron and their alloys.
 - Compact, everything enclosed.
 - Four etching heats.
 - Renewable work plate.
 - Ground clamp for large work.
- THREE OTHER MODELS ALSO AVAILABLE**



IDEAL

**ELECTRIC
MARKER**

- Permanently marks on all materials — glass, metal, ceramics.
- Used like a pencil.

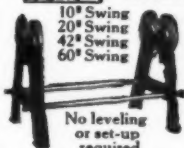
- 7200 cutting strokes per minute.
- Special Alloy or Diamond Cutting Point.

IDEAL LIVE CENTER

- Timken roller bearing carries thrust load.
- Radial load turns on new departure bearings.
- Work with heavier loads at higher speeds.
- Save man hours on centering work.
- Interchangeable inserts permit use with all kinds of centered and uncentered work.



IDEAL BALANCING WAYS



No leveling
or set-up
required

- Simplify balancing crankshafts, pulleys, flywheels, etc.
- Work carried on free-turning, special steel discs.
- Precision ball bearings.

- Adjustable for different length work.

ASK ABOUT FREE DEMONSTRATION

IDEAL COMMUTATOR DRESSER CO.

1441 PARK AVE., SYCAMORE, ILLINOIS

Sales Offices In All Principal Cities
In Canada: Irving Smith, Ltd., Montreal, Que.

Die Reproduction

The ordinary shop owner in building forming dies or reproducing forms for plastics has to depend upon the skill of his men.

Various methods have been developed for this kind of work. One of the most promising ways of reproducing these uneven surfaces is through the use of hydraulic attachments adaptable to all machine tools. Boring mills, milling machines, lathes, planers, shapers and grinders have been equipped with these easily operated devices.



The illustration shows such a hydraulic duplicating attachment applied to a No. 42 Lucas Boring Mill at the Buell Die & Machine Co. Incidentally this company has purchased four of these Turchan hydraulic attachments during a period of six years. During the die season, these are run 24 hours a day.

Hydraulic cylinders attached to the housing and the connecting rods and attached to the bar, give the hook-up that controls the bar movement. The tracer is a valve that permits the oil to go into the cylinders in varying amounts, causing the cutter to move in and out to conform with the contour of the model.

If the tracer tip is at the bottom of a cavity, either the up-and-down feed can be used, or the longitudinal feeds of the table. The slightest rise or drop on the surface of the model is reproduced by the tracer control valve. There are no screws to move, or solenoids. Just a smooth flow of oil that allows the cutter to pull back slowly or in a fast smooth motion with plenty of power to take the heavy cuts for which the mill is designed.

It is emphasized that the ease and simplicity of operation enables the operator to handle the equipment with very little schooling. Usually two to three hours practice suffices. A small cable is attached to the end of the valve as its hand control. The valves are so set that when the hydraulic power unit is started, the tracer with cutter will move toward the model until it touches. Then forward movement ceases, feeds are then thrown in and cutter will start to duplicate the model.

One of the largest duplicating machines ever built is now said to be operating with Turchan controls. On this boring mill, the largest of turret top dies are being reproduced.

The hydraulic duplicating attachments are built also for the smallest of high speed milling heads, enabling the reproduction of small cavities with small end mills and pressure of the tracer tip on model is as little as one ounce.

A Handy Vise

Speedy and secure clamping are offered in a vise produced by a California manufacturer. Changes are made by simply sliding the moveable jaw to the position desired—a half turn of the screw will lock the work. It is asserted that the patented undercut threads form a positive lock between the screw and half nut.

This modern vise is said also to be well adapted to the making of special jigs. The tops and sides as well as the faces of the jaws are ground and squared. The top surface of the fixed jaw is said to provide space adequate for drilling and tapping so that jig plates may be bolted in position.

Metal-Cutting Radial Saw

For cutting bar stock, rounds, angles, tubing and sheets of all kinds of metal and many refractory materials, a new No. 1 Metal-Cutting Saw has been developed.

Operating back and forth in a sturdy radial arm, the high-speed geared motor drive unit is fitted with either 3/32" thick abrasive wheels, or special metal-cutting saw blades. It is asserted that the radial saw will cut steel, iron, brass, aluminum duralumin, copper, high-speed steel and all kinds of alloys.

The wheels and blades have a maximum cutting depth of 4", and will handle work within the capacity of the one or two h.p. motors. The illustration is taken from the back of the machine and shows the coolant pump, vise-carrier, and rapid-acting vise,—accessories that are available for general use in cutting bar stock, tubing and metal mouldings.

In addition to straight cut-off work, this machine is quickly set up for angle cuts and miters that are accurate and dependable for all production operations.

The company offers its services in making test cuts on samples and submitting recommendations as to the best type of wheel or blade for any given job. Deliveries can be made promptly.

Gun-Rifling

Simplicity of mechanical features—that is a brief way to describe the new LeBlond No. 2 Gun Rifling machine. It is built for rifling guns up to 3" bore 88" in length.

Indexing the gun or indexing the bar is quite simple with this machine. The grooves may be cut or broached. Adjustable automatic stops control the movement of the carriage. At the end of each stroke, it stops. Any travel is possible up to the maximum of 10 feet.



Conveniently located on the control rod are two manually operated levers. The control rod runs the full length of the bed, and operates a four-way valve to start, stop, and reverse direction of travel on the carriage. In the head-end leg are two adjustable hydraulic speed control valves—one to change the speed of the carriage on the forward stroke, while the other performs a similar duty on the return stroke.

A 5 h.p. constant speed motor is directly connected to a constant delivery, vane type rotary pump having a capacity of 18 gallons per minute, and exerting a maximum pressure of 600 lbs. per sq. in. This pump energizes the main hydraulic cylinder.

New Trade Literature

SHEET METAL TOOLS

Catalog No. 14 is a handy new pocket-size 92-page introduction to an unusually extensive line of sheet metal working tools offered by Whitney Metal Tool Co., 115 Forbes St., Rockford, Ill. Most of the items in the Whitney line are illustrated and descriptions and specifications are given.

PREFINISHED METALS

A handsome 32-page catalog and several new mailing pieces present the American line of prefinished metals and the advantages of using these products of the American Nickeloid Co., 1311 Second St., Peru, Ill.

DIE CASTING MACHINES

A new bulletin gives detailed information on the Giant Kippcaster, produced by Madison-Kipp Corp., 207 Waubesa St., Madison, Wis. Another new publication introduces this well-known line of air driven grinders.

CARBIDE TOOL GRINDERS

Bulletin 46101 is a 16-page story on the new carbide tool grinders offered by Ex-Cell-O Corp., 1188 Oakman Blvd., Detroit, Mich. Various popular carbide tools are shown together with machines, accessories and grinding wheel combinations for keeping the tools in A-1 condition.

GRINDERS AND MOTORS

Bulletin No. 1003 presents the "B-Line" of ball bearing grinders and buffers made by The Brown-Brockmeyer Co., Inc., Dayton, O. These are available in sizes from 1/4 to 5 h.p., inclusive. Bulletin No. 1002 covers the line of motors, plain and geared head, in capacities from 1/4 to 15 h.p.

PRECISION JOBBING WORK

Two attractive new bulletins explain the facilities offered by Acme Industrial Co., 210 N. Laflin St., Chicago, for contract precision manufacture, supplementing industrial plant equipment.

AIR FILTERS

Bulletin 340 by Logan Engineering Co., 4916 Lawrence Ave., Chicago, Ill., describes in detail the operation of the "Aridifier" which removes moisture, oil and dirt from compressed air and gas lines by centrifugal force. Application and installation details are given.

NAIL, RIVET AND SCREW PRODUCTS

Catalog No. 40 by Hassal Products, Clay and Oakland Sts., Brooklyn, N. Y., presents many examples of nails, rivets, screws and cold forged products in the standard Hassal line. Also it explains the broad service offered by this firm in the production on contract of special items of this kind.

PRESSES, PUNCHES AND SHEARS

Catalog No. 106-A gives in handy pocket form a condensed resumé of the extensive line made by Niagara Machine & Tool Works, 637 Northland Ave., Buffalo, N. Y. Many different sizes of presses are included as well as circle and square shears, seamers, roll-formers, and beading machines.

CLAMPS

An extensive line of clamps is described in a new catalog by the Adjustable Clamp Co., 418 N. Ashland Ave., Chicago, Ill. Items included are machinists' clamps, welders' clamps, carriage clamps, steel bar clamps, "C" clamps, etc. This catalog also offers several related devices such as steel spindle handscrews, lathe dogs, etc.

MARKING DEVICES

A descriptive folder is announced on the "Acromarker" line of marking devices. These bench model machines stamp metal, plastics, wood, and many other materials with lettering and numbering. The manufacturer is the Acromark Co., 259 N. Broad St., Elizabeth, N. J.

JESSOP STEELS

A series of bulletins is offered by the Jessop Steel Co., 603 Green St., Washington, Pa. "Carbon Tool Steels" includes informative data as well as descriptions of the Jessop offerings. Other bulletins cover their high speed steels, non-magnetic steels, die steels, and air hardening die steels. One folder describes a "non-shrinkable" alloy steel.

"Silver-Ply" stainless-clad steel is described in a 24-page booklet. This product is a composite sheet or plate consisting of a layer of stainless steel which has been welded to a mild steel backing during the rolling process.

METAL CUTTING SAW BLADES

Capewell Mfg. Co., Hartford, Conn., announces a catalog on their metal cutting saw blades. A wide variety of blades for hack saws and band saws is described.

TRICO OILERS AND FUSE AIDS

"Unbreakable" oilers are described in Bulletins 27 and 28, offered by the Trico Fuse Mfg. Co., Milwaukee, Wis. No. 27 covers their thermal oilers and adapters, while the other folder gives detailed information on their wick feed and loose pulley oilers.

Clamps for fuse clips are described in another Trico bulletin. The "Kliplok," as it is called, is available in a wide variety of sizes for use with the three standard types of fuse clips.

COUNTING DEVICES

"Productimeters—Speedometers of Industry" is the title of an illustrated folder announced by the Durant Mfg. Co., 1928 N. Buffum St., Milwaukee, Wis. This Bulletin gives a general view of the countless ways in which Productimeters are employed in industry. Photos show specific applications of seven of their more than 100 standard types of counters.

"STACKBINS" AND "STACKRACKS"

A handsome illustrated catalog is offered by the Stackbin Corp., 55 Troy St., Providence, R. I. The "Stackbin System" of storage and

handling is described in detail. In addition to Stackbins and Stackracks there are descriptions of Stackbins assembly bins, machinists' bench, box truck, etc.

BAND SAW

The Boice Crane Co., Toledo, O., announces a bulletin describing their model 2300 band saw. With a sawing capacity from blade to guard of 13½", this modern band saw is offered in both bench and floor models. It is designed for cutting wood, metals, fiber, plastics, and other industrial materials.

HYDRAULIC CYLINDERS

A handsome, large-page catalog is announced by the Tomkins-Johnson Co., 605 N. Mechanic St., Jackson, Mich. It gives detailed information about their extensive line of hydraulic cylinders. This brochure is lavishly illustrated with photographs and working diagrams of "T-J" oil and water hydraulic cylinders. The manufacturer declares that this booklet includes information that, so far as they know, has not previously been included in a book of this kind.

ALUMINUM LADDERS

A new 44 page catalog, describing many types of aluminum ladders, is offered by the Aluminum Ladder Co., 126 Adams St., Tarentum, Pa. In addition to the usual broad selection of ladders for fire fighting, industrial and commercial use, the new catalog includes data on aluminum gangways, stages, scaffolding, conveyors and many special aluminum ladders.

FLOOR RESURFACER

"Ruggedwear" resurfacer is the subject of a bulletin issued by the Flexrock Co., 2305 Manning St., Philadelphia, Pa. Made of mineral asphalt, cellulose, and other materials, "Ruggedwear" is said to provide a tough, long-lived material for patching broken concrete floors or even for covering an entire floor.

MOTOR DRIVES

Berkeley motor drives, as applied to grinding machines, are described in Bulletin No. 65, announced by the Berkeley Equipment Co., Corry, Pa. This informative circular includes photographs of Berkeley motor drive installations on several well-known makes of grinders.

ROTARY TABLES

Alfred A. Troyko, 4422 Appleton St., Oakley, Cincinnati, O., offers an eight-page 1941 catalog. This attractive booklet gives detailed information on the complete line of Troyko rotary tables.

VARIABLE SPEED TRANSMISSION

A catalog describing a variable speed transmission is offered by the Lenney Machine & Mfg. Co., Warren, O. This booklet contains an unusually large amount of information with specifications and many engineering drawings.

RECIPROCATING HEAD

"Multi-purpose" tool and accessories are described in a new four page catalog just released by the H & H Research Co., 12541 12th St., Detroit, Mich. It gives details concerning the tool itself, the six different types of accessory tools that may be used with it (honing stones, files, chippers (steel or wood) and wood gouge, sander, saws).

The "Multi-purpose" operates with a reciprocating motion as contrasted to the revolving head of the better known tools of this type.

BOOKLET ON WELDERS

A new 12 page illustrated booklet giving valuable facts about welders and their operation is announced by the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa. Covered in the booklet are motor and engine driven welders, and bare welding generators. Application for each type of welder is discussed, and a general description of each provided. Fourteen characteristic curves, covering all the general types, are a feature of this booklet, and give interesting data on welder operation.

SURFACE BROACHING MACHINES

New style single and double slide vertical surface broaching machines are illustrated and described in the 24 and 16 page bulletins 23001 and 24001 published by The Oilgear Company, 1310A West Bruce Street, Milwaukee, Wisconsin. Twenty-two standard machines are offered. Over forty typical surface broaching machine installations are illustrated and described.

AERO TEST STAND

A new four page bulletin in color introduces the U. S. Varidrive Aero Test Stand—a multi-purpose unit for testing aircraft generators, vacuum pumps, hydraulic pumps, fuel pumps, alternators, etc. It is made by U. S. Electrical Motors, Inc., 200 E. Slauson Ave., Los Angeles, Cal.

JONES & LAMSON BULLETINS

New bulletins are available covering the various lines made by Jones & Lamson Machine Co., Springfield, Vt. These include Ram and Saddle Types of Universal Turret Lathes, Fay Automatic Lathes, Automatic Thread Grinders, Comparators, Automatic Opening Dies and Chasers.

CINCINNATI GRINDING MACHINES

Booklet G-446, entitled "Filmatic" tells the complete story of Filmatic Bearings featured in the Grinding Machines made by Cincinnati Grinders, Inc., Cincinnati, Ohio.

MACHINE TOOL DRIVES

Torq Drives for all types of machine tools are presented in a catalog offered by The Torq Electric Co., 6605 Carnegie Ave., Cleveland, Ohio.

DRILLING MACHINES

Many different types of production drilling equipment are made by The Avey Drilling Machine Co., Cincinnati, Ohio. These are illustrated and described in new catalog.

DRILL GRINDERS

Fast production needs correctly ground drills. They can be ground rapidly and precisely on the Drill Grinder, made by Wm. Sellers & Co., Inc., 1616 Hamilton St., Philadelphia. New illustrated catalogs give the whole story.

FASTER SCREW DRIVING

The Thor "Pix-Up" Finder and Adjusto-Torq facilitate the picking up and driving of screws. Address Independent Pneumatic Tool Co., 612 W. Jackson Blvd., Chicago for a new bulletin giving all the facts.

MILLING, DRILLING AND ROUTING

The No. 540 Universal is especially useful in wood and metal pattern shops, providing

quick and easy set-ups for tough pattern jobs. Address Ekstrom, Carlson & Co., Rockford, Ill., for descriptive bulletin.

MULTIPLE TAPPING OR DRILLING

Bulletin No. 3 describes the Etco-Emrick system of "tailored to fit" multiple tapping and drilling heads offered by Etco Tool Co., 596 Johnson Ave., Brooklyn, N. Y.

AMMCO 6" SHAPER

The many interesting mechanical details of the Ammco 6" Shaper are presented in a bulletin offered by Automotive Maintenance Machinery Co., 2112 Commonwealth Ave., North Chicago, Ill.

LATHES AND CUTTER GRINDERS

Super Regal Lathes and the No. 2 Cutter Grinder are illustrated and described in new literature available from The R. K. Le Blond Machine Tool Co., Cincinnati, Ohio.

FILES FOR ALUMINUM

Type A Files for aluminum are described in a new technical bulletin offered by Nicholson File Co., Providence, R. I.

MILLING MACHINES

Bulletin 662-A covers the Milwaukee Midgemill made by Kearney & Trecker Corp., Milwaukee, Wis.

CONOMATIC SCREW MACHINES

New catalogs give full information on Conomatic Screw Machines made by Cone Automatic Machine Co., Inc., Windsor, Vermont. These units are built with 4, 6 and 8 spindles for manufacturers who want to streamline production.

PRECISION TOOLS

A broad line of high precision tools for today's vital needs is offered by Brown & Sharpe Mfg. Co., Providence, R. I. All of these are fully described in a new catalog.

FLEXIBLE SHAFTS AND MACHINES

Catalog No. 28, a manual of flexible shaft equipment and accessories, is offered by N. A. Strand & Co., 5001-9 N. Wolcott Ave., Chicago.

PORTABLE ELECTRIC TOOLS

A new catalog introduces the broad line of Skilsaw portable electric tools, including numerous types of drills, saws, sanders, grinders, etc., Address Skilsaw, Inc., 5035 Elston Ave., Chicago.

UNIVERSAL PRECISION TOOL GRINDER

A new bulletin, No. 54, issued by Hannifin Mfg. Co., 621-631 So. Kolmar Ave., is devoted to their new No. 5 Universal Precision Tool Grinder, with many up-to-the-minute features.

SURFACE GRINDERS—RADIAL DRILLS

The Hammond line of Surface Grinding Machines and Sensitive Radial Drills has recently been acquired by The Foote-Burt Co., Cleveland, Ohio. Bulletins give full details.

CUTTING OILS

A broad line of cutting oils and lubricants for machine tools of all kinds is offered by the D. A. Stuart Oil Co., Ltd., Chicago, Ill. Bulletins give detailed information on the different products.

FLEXARMS

Catalog "TC" describes the Flexarms offered by S. S. White, Dept. H, 10 East 40th St., New York, N. Y. These devices enable you to put spare motors to work on flexible shaft operations. Other flexible shaft equipment and accessories are covered.

STOCK RACKS

Some additions to the Yohe line of Self Balancing Floor Stands are covered in a new leaflet issued by Wm. S. Yohe Supply Co., 503 Mahoning Road, N. E. Canton, Ohio. Shoulder high, these racks afford handy storage space for an astonishing quantity of stock and there is a minimum amount of lifting.

MAGNETIC BRAKES

Bulletin No. 604 covers the line of Magnetic Disc Brakes offered by Stearns Magnetic Mfg. Co., Milwaukee, Wis. Photos and drawings are given of many of the different types, with full descriptions and specifications.

STEEL TREATING SERVICE

"Steel Stamina" is the title of a colorful bulletin offered by the Lindberg Steel Treating Co., 218-230 N. Laflin St., Chicago, Ill. This folder lays special emphasis on the Tocco process of selective surface hardening by electrical induction used by Lindberg.

HYDRAULIC LIFT TRUCK

A Lyon Hydraulic lift truck is described in Bulletin No. 117, announced by the Lyon Iron Works, 103 Madison St., Green, N. Y. This truck is offered in models for double-faced and for single-faced pallets.

GRINDING AND LAPPING

T. C. M. Mfg. Co., Harrison, N. J., offer Bulletin No. 409, which is about "All-in-One" equipment for grinding and lapping. The "All-in-One" is designed for grinding all types of cutting tools. A drill grinding attachment is also available. This bulletin also describes the "All-in-One" brazing fixture.

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☐ Thread Roll. Mch.
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☐ Toggle Pliers
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☐ Tool Holders
☐ Tool Salvage
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☐ Tools, filing
☐ Tools, lathe & plan.
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☐ Tools, pneumatic
☐ Tote Pans
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☐ Tumbling Barrels
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☐ Welders, engine driven
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Lathe, 21x8" LeBlond hy. duty, q. c. g.
Lathe, 20"x12" Whitcomb-Blaisdell.
Lathe, 32"x12" H. S. & G. q. c. g.
Lathes, turret, No. 3 & No. 10 Foster, motorized.
Mill, No. 29 Ohio uni., complete, cone drive.
Mill, No. 1-A plain K&T single pulley drive.
Press, No. 75 Toledo open back, geared.
Saw 6x6 Peerless shaping motor dr.
Screw machines, 24" Gridley sgl. spdl. m. d.
Screw machine, 18x8" Acme, m. d.
Shapers, 20" & 24" G&E crank, b. gd. cone dr.
Thread miller, No. 3-C Lees Bradner, motor drive.

FOR SALE BY

Siegmans Machinery Co., Inc.

561 W. Washington Blvd., Chicago, Ill.

Automatics, Clevis, Model B's 7/8" and 1 1/2" machs.
Band saw, Marvel No. 8, 18x18, m. d., b. b.
Chucking machine, 4 s.p.d., Gridley model H 4 1/2" m. d.
Grinders, rotary, Head 8" with magnetic chucks, (2).
Grinder, Norton 12x36, motor drive, cylinder.
Grinder, tool & cutter, Cincinnati No. 1.
Grinder, tool & cutter, Wilmarth & Morman, No. 1.
Grinder, Landis 1 1/2, universal.
Lathe, N. B. P. 36"x18" L. C. G. double b. g.
Lathe, 24"x12" Schumacher-Hoye, l. c. g.
Mill, Cincinnati No. 3 s.p.d. high power, rap. trav.
Press, hydraulic, heating platens, 18" ram, 2 1/2" day-light, 20x20 platens.
Press, punch, Massillon No. 7, 160 ton 6" stroke, b. gd., can be seen in operation.
Press, punch, Bliss Cons. No. 7, 4" stroke, b. g. m. d.
Screw machines, hand, No. 3 Foster p. feed to turret, friction back geared, (2).
Screw machine, hand, Warner Swasey, 1" cap.
Screw machine, hand, Warner Swasey, 4" cap.
Screw machine, hand, Foster, 1" cap.
Thread cutter, Coultter auto, 6" g. h. 4"x24" s.p.d.
Thread generator, Fellows 4"x12" capacity.

Please send us your inquiries.

Reliance Machinery Sales Company

1407 Brighton Place, N.S. Pittsburgh, Pa.

Air compressors, 139 and 450 cu. ft.
Borer, car wheel, for 42" wheels.
Grinder, Bath 12x32" univ.
Hammer, 300 lb. Bradley, upright helve.
Hammers, 50 lb. Mayer upright, m. d.
Lathe, 27"x15" Red-Prentice, arr. m. d.
Miller, 36"x10" Newton planer type.
Miller, No. 7-H Becker Lincoln type.
Plate planer, 26" Covington, m. d., 3-60-440.
Press, No. 21 1/2 Bliss, blanking, m. d.
Press, horning, No. 40 Bliss.
Press, No. 82-C Toledo dbl. crank, 5" shaft, 44" wide.
Press, horning, No. 39 Bliss.
Press, toggle drawing No. 38-A Bliss.
Roller leveller, 54" 17-44" rolls, m. d.
Slotter, 15" Bement, crank, 36" rot. table.
Turret lathe, No. 9 B. & O., 3" hole.

What do you need? What have you for sale?

USED AND REBUILT MACHINERY

FOR SALE BY

Nelson Machinery Co., Green Bay, Wis.

Brake, Keene 16' Cornice, No. 114.
Compressor, 1 R Imp. 12x12, 74x12 Duplex 337, c.f.m.
Drill, 30" Barnes, sliding hd., H.W.L. & G. p.l., bd.
Gear cutter, Reynolds 18" spur & spiral.
Hoist, 6 ton V & T with trolley.
Planer, Lodge & Davis 24x24x6, belted.
Planer, Ohio 28x28x8, belted.
Punch, Reade, 36" throat, plain, m.d.
Roll, Doty, with 3, 7"x6" hand operated rolls.
Shear, Lennox circular cutting and beveling, belted.
Turret, Conradsen 26"x8", 3" hole.

S. M. Regar Machinery and Mill Supplies
Tampa, - - - Florida

Boring mill, Bickford, s. p. d., horiz., table 33"x80".
Boring mill, Niles 36", 2 swivel heads, vertical.
Boring mill, Niles 30", 1 swivel head, vertical.
Lathe, Bement Miles, l. c. e., 36" factory raising blocks, 44"x25" bed.
Lathe, Gisholt, 24", hole in spindle 6".
Lathe, National 18" production, hole in spindle 1 1/2, cone head, (3).
Slotter, Bement Miles 18", circular table.

C. R. Daniels

1514 W. Capitol Drive, Milwaukee, Wis.

LARGE TOOL EQUIPMENT

Boring mill, belt d., old style 72" Niles vert. \$ 750.
Drill grinder, Yankes. \$ 50.
Hack saw, 4x4 Racine, m.d. \$ 55.
Jobbing machine shop, \$ 55000.
Tractor plant to be sold as going business \$150,000.

Joseph Hyman & Sons,

Tioga and Almond Sts., Philadelphia, Pa.

WORLD'S LARGEST STOCK
POWER PRESSES

No. 5C Bliss, double crank, tie rod, 54", crank 5"-54".
No. 5 Bliss, double crank tie rod, 36" 5"-54" shaft.
No. 45 E Niagara, gap, grd... double crank, 72".
No. S 206 Ferracute, dbl. crank 124", crank 7 1/2"-9". (3)
No. 105 Consolidated gap, d.e.
STG 183 Ferracute gap, double crank, gap.
Nos. 92B, 91C, 90D, Toledo double crank presses.
No. 3719 Hamilton, straight side, tie rod, crk. 12"-19"
No. 748, Bliss geared, straight side.
Nos. 54, 55, 55A, 54 Toledo, geared straight side.
No. 38 H Bliss toggle press.
No. 1444 Toledo toggle press.
Nos. PA3 Ferracute & 13 Toledo horning.
No. 254 Bliss-Consol. horning.
No. 683 Toledo, 250 ton knuckle joint, coining.
75 ton EG 61 Ferracute; 400 ton Waterbury-Farrel, knuckle joint, coining.
250 ton Waterbury F. coining.
125 ton & 150 ton Waterbury Farrel coining.
150 ton EG52 Ferracute.
Bliss roll forming machine, 5 pairs rolls for stock up to 28" wide, 4" bearings, weight 28,000 lbs.
Squaring shears, various sizes.
Gang slitter, 60", Lamb & Nash (Braddock) type H.
These and hundreds of others of popular makes and sizes, are in stock at our warehouse here.

Rebuilt and Guaranteed.

FOR SALE BY

S. M. Regar Machinery and Mill Supplies
Tampa, - - - Florida

Boring mill, Bines horiz., knee type, 4" spindle.
Cold saw, Higley m. d. No. 27-36", takes blade 32".
Hammer, Lingie 50 lb. power, arranged m. d.
Hammer, Williams White, Yeakley type, 400 lb. pneum.

Russell Machine Co.

438 Oliver Bldg. Pittsburgh, Pa.

Boring machine, Barrett 5" dia. bar cylinder.
Boring mill, 42" Colburn, grd. feeds, 2 hds., s.p.d.
Boring mill, horiz., 64" bar, Niles, floor type.
Boring mill, 10" Niles vertical.
Gear cutter, 36" Brown & Sharpe.
Hammer, 200 lb. Bradley, upright strap.
Hammer, 1500 lb. Bliss board drop.
Hammer, No. 2500 dbl. frame Chambersburg steam
Lathe, 42"x17" Pond, p.c.g., triple grd., b.d.
Pipe cutting & threading machine, 6" Landis.
Press, hyd. wheel, 300 ton Chambersburg, m.d.
Shaper, 34" Cincinnati, belt drive.
Shear, A. Alligator, No. 61 Carlin high knife, 24" sq.
Shear, 10"x4" United power squaring, m.d.
Shear, 66"x2 1/2" McAllister, b.d.
Straightener, No. 1 Shuster flat strip metal, m. d.
Straightener, No. 1 Kane & Roach, cap. 4" rd.
Upsetting machines, 24, 36, 4 and 5" Ajax iron bed.

O. T. Webb Machinery Co.

743 N. 4th Street, Milwaukee, Wis.

Centering machine, 2 spdl., 3" to 4" spindle... \$ 50.
Drill, high speed ball bearing 14" 4 spindle... 200.
Drill, 14" Demco ball bearing No. 23... 75.
Grinder, No. 1 LaSalle plain and surface... 65.
Hack saw, 4"x8" Peerless h. s... 95.
Lathe & chuck, 14"x6" Carroll & Jamieson... 75.
Lathe, 40"x18" Ffield, comp. rest & c. shaft... 400.
Shaper, 16" Rockford, b.g., cone, drive... 550.
Shaper, 18" Hendey, friction drive... 200.
Shaper, 30" Walcott, shifting belt... 250.
Shaper, 36" Hendey, friction drive... 250.

Modern Auto Repair Co.

4601 Olive St., St. Louis, Mo.

Forest 6500

GRINDER FOR SALE

No. 2 12x36 plain Cincinnati grinder, serial No. B394, belt driven, overhead countershaft.
This machine hasn't been used very much and is in first class condition.

Bauer Machinery Company

1116 Frankford Av., Philadelphia, Penna.

Grinder, Van Norman No. 3.
Grinders, Heald No. 75 internal, (8).
Grinder, Heald No. 60.
Lathe, brand new Wade high precision, bench 9 1/2"x20".
Milling machine, Davenport No. 2B pl. arr. m. d.
Milling machine, B & S No. 4 plain, c. d.
Bullard, 26" R. P. T., with New Era turret hd. & s. hd.
Automatic tapping machine, Fottstown.

USED AND REBUILT MACHINERY

Lang Machinery Company

22th St. & A. V. R. R.

Pittsburgh, Pa.

Air compressors, Ingersoll-Rand X-B-2, 600, 885, 1200 & 1500 cu. ft. 100 lb. pressure, motor drive.

Air comp., W-J 3 Sullivan, angle comp., 468 c.f., m.d.

Air comp., 14"x13" Ing. Rand "E-R-1", 464 c.f., m.d.

Bolt cutter, 1" Landis, 18"-3" agl. hd., b. d.

Bolt cutters, 1" Acme, Landis hds., 2 & 3 spdl.

Bolt cutter, 3" Acme, Landis head, b. g., b. d.

Boring mill, 20" Bullard, threading attach., s. p. d.

Boring mill, 25" Bullard, rapid prod., s. p. d.

Boring mill, 42" Bullard, 2 swivel heads, s. p. d.

Boring mill, 42" Colburn, grd. fds. 2 hds., t. p. d.

Boring mill, 72" Niles, 2 heads, fric. feed, b. d.

Boring mill, horiz. 24" bar Binsee, knee type, b. d.

Boring mill, horiz. 30" bar D & H floor type.

Boring mill, horiz. 5" bar Barrett, b. d.

Boring mill, horiz. 64" bar Niles, floor type.

Bar turning mch. Brightman, 24"x18", m. d.

Bar turning mch. Brightman, 64"x19", b. d.

Buffer & Polisher, 75 H. F. Marbach, 320/3/60.

Crane, 5 ton Shaw 50' span, 3 motors, d.c.

Drill, radial, 2" Mueller, t. a. b. d.

Drill, radial, 3" Cincinnati-Bickford, gear box, m. d.

Drill, radial, 4" Bickford, t. a. m. d.

Drill, radial, 4" Morris, t. a. m. d.

Drill, radial, 4" Fosdick, t. a. b. d.

Drill, radial, 6" Cincinnati-Bickford, t. a. m. d.

Drills, upright, 14" to 32", belt drive & m. d.

Drills, upright, 36" Aurora and Snyder, p. f., b. d.

Drills, No. 1 Avey, Sens., m. d. (2).

Drill, No. 2 Avey agl. spdl., 12" o. h., b. d.

Drills, 20" Barnes, Camel back, m. d. (2).

Dividing head, 20" diameter.

Gear cutter, 48"x12" Gould & Eberhardt, s. p. d.

Gear cutter, spur, 34" Newark, m. d.

Gear hobber, No. 2 S. S. cap. 36"x12" m. d.

Gear mill, No. 1 Bilton, range to 4" dia. b. d.

Gear planers, bevel, 54" Gleason, m. d. (2).

Grinder, centerless, No. 3 Cincinnati, m. d.

Grinder, disc, 18" Diamond, dbl. end.

Grinder, dbl. end, 8" U. S. Elec. 320/3/60/3450 r. p. m.

Grinder, dbl. end, 12" Marschke, 3 H. P. 220 v. D. C. 1700 r. p. m.

Grinder, dbl. end, Dillon 75 H. P. 220/3/60/1750 r.p.m.

Grinder, dbl. end, Standard Elec. 75 H. P. 220 v. d. c.

Grinder, internal cylinder, No. 5 Landis, b. d.

Grinder, piston, No. 2 Van Norman, b. d.

Grinder, plain cyl., 12"x26" Landis, b. d.

Grinder, surface, No. 1 W & M, b. d.

Grinder, No. 60 Heald, b. d.

Hammer, 20-lb. Bradley, upright strap.

Hammer, 100 lb. Bradley cushion helve, belt drive.

Hammer, power, 300-lb. Bradley, upright helve.

Hammer, power, No. 4 Beaudry, b. d.

Hammer, board drop 800 lb. Chambersburg, b. d.

Hammers, steam drop, 1000-lb. to 8000-lbs.

Keyseaters, Mitts & Merrill No. 5-38", m. d.

Keyseater, No. 24 Baker, 38", m. d.

Lathe, 14"x10" Seneca Falls, p. c. g., b. d.

Lathe, 16"x10" Cincinnati, q. c. g., d. b. g., b. d.

Lathe, 16"x10" Bradford, grd. head, q. c. g., m. d.

Lathe, 16"x34" South Bend grd. head, q. c. g., s. b. g., b. d.

Lathe, 17"x18" Sidney grd. head, hvy. duty, m. d.

Lathe, 18"x8" Rockford, s. b. g., semi-q. c. g., m. d.

Lathe, 18"x8" South Bend, p. c. g., s. b. g., b. d.

Lathe, 18"x8" Prentice turning, d. b. g., p. c. g., b. d.

Lathe, 20"x10" Hamilton g. d. head, q. c. g., s. p. d.

Lathe, 20"x10" Monarch, q. c. g., d. b. g., b. d.

Lathe, 20"x10" Johnson, p. c. g., s. b. g., m. d.

Lathe, 22"x10" Bradford, q. c. g., d. b. g., b. d.

Lathe, 24"x16" Bradford, q. c. g., d. b. g., b. d.

Lathe, 26"x11" Wickes hvy. duty comp. Eng. & Tur.

belt drive.

Lathe, 26"-48"x18" McCabe 2-spdl., int. dr., b. d.

Lathe, 27"x11" LeBlond, grd. hd., q. c. g., d. b. g., m. d.

Lathe, 27"x13" Putnam, hvy. duty, q. c. g., d. b. g., b. d.

Lathe, 28"x14" Schu. & Boye, hvy. duty, p. c. g., b. d.

Lathe, 32"x14" S. & H. hvy. duty, d. b. g., q. c. g., b. d.

Lathe, 32"x16" Schumacher & Boye, p. c. g., d. b. g., b. d.

Lathe, 32"x18" American, p. c. g., t. a. b., b. d.

Lathe, 36"x26" 6" New Haven, p. c. g., b. d.

Lathe, 36"x15" N-B-P turning, grd. head, m. d.

Lathe, 40"x18" Fifield, trip, grd., int. face plate d., b. d.

Lathe, 42"x30" Springfield trip, grd., p. c. g., b. d.

Lathe, 46"x17" 7" Pond, triple grd., p. c. g., b. d.

Lathe, 52"x15" New Haven, trip grd., b. d.

Lathe, 54"x11" Detrick & Harvey, t. a. b. d.

Lathe, gun boring, 3 bar, cap. hole 12"x60", m. d.

Lathe, turret, 14" Garvin, h. s., 18", p. f., b. d.

Lathe, turret, 16" Warner-Swasey, h. s. 17/16", p. f., b. d.

Lathe, turret, No. 3 Warner-S. pl. head, h. s. 14", b. d.

Lathe, turret, 18" Reed, h. s., 18", p. f., b. d.

Lathe, turret, 21", Gisholt, h. s., 8", b. d.

Lathe, turret, tilted, 21" Woods, grd. fric. head, b. d.

Lathe, turret, 24"x24" Jones & Lamson, h. s. 24", s. p. d.

Lathe, turret, 24", Gisholt h. s., 8", m. d.

Leveiler, 64" Berisch 7 rolls, m. d.

Miller, duplex, 36"x28" 18" Ingersoll, m. d.

Miller, hand, Reed, table 7'x12", b. d.

Miller, plain, No. 6 Steptoe, table 20'x24", b. d.

Miller, plain, No. 2 Cincinnati, table 34'x10", b. d.

Miller, plain, No. 5-C Becker-B., tbl. 60'x16", b. d.

Miller, prod., Gooley & E. Type A, tbl. 24'x8", b. d.

Miller, slab, 30'x24" 12" Ingersoll, adj. rail, m. d.

Miller, univ., No. 6 Kempsmith, table 30'x60", b. d.

Miller, univ., No. 2 B. & S., tbl. 36'x8" div. hd. b. d.

Miller, univ., No. A-B & S., tbl. 37'x11" div. hd. m. d.

Miller, univ., No. 2-B Hendy Norton, tbl. 48'x10", b. d.

Miller, univ., No. 3 Garvin, div. hd., tbl. 48'x10" p. d.

Miller, universal, No. 4 B & S., tbl. 54'x13", b. d.

Miller, vert., No. 2 Becker, table 16'x8", b. d.

Miller, Vert. Taylor & Fenn, tbl. 20'x8", m. d.

Miller, vert., No. 4-B Becker, tbl. 36'x10", m. d.

Vertical attach., for No. 5 grd. hd. Cincinnati miller.

Pipe machines, Landis 8" to 8", belt drive (2).

Pipe machines, No. 304-B Oster and 305-B Oster, m. d.

Pipe machines, 6" Landis gear box a. c. m. d.

Pipe machines, 8" Williams, 20" to 2" motor drive.

Planer, openend, 36'x26" 12" Cleveland, 3 hds. m. d.

Planer, 36'x26" 10" Cincinnati, 3 heads, m. d.

Planer, 36'x26" 11" Sellers, 2 heads, b. d.

Planer, 72'x63" 14" Gray, 4 heads, b. d.

Presses, arch, No. 52 Toledo str. 2" and 44", m. d.

Press, coining, E.L.C. 4 Ferrate.

Press, double acting, No. 1 Bliss, roller feed.

Press, dbl. crank, 75-D, Stoll 72"x26", m. d.

Press, dbl. crk., No. 85 Bliss, stroke 20", m. d.

Press, foot lever, No. 67 Bliss stroke 18", m. d.

Press, hyd. 300 ton W-S-M, betw. uprs. 44", b. d.

Press, hydraulic, forging, 1000 ton Morgan.

Press, O.B.I., No. 18, 19 & 20 Bliss str. 18", 2", 3", m. d.

Press, perforating, No. 5 V & O, str. 8", dbl. crk., b. d.

Press, straightening, Hunt hydraulic, 75 tons.

Press, trimming, No. 2 Billings & Spencer, 80 tons.

Press, wheel, 300 ton Chambersburg, m. d.

Profilers, Nos. E3 and E4, Keller, motor drive.

Punch, lever, No. 85 Niagara, 38" throat.

Punch & shear, No. 55 Hendley & Whitt, comp. b. d.

Saw, band Type J M Laidlaw, cap. 6", m. d.

Saw, band 36" Crescent, tilting tbl. 26'x24", b. d.

Saw, buck, 6"x48" 6"x24" 5"x12" 12"x12" b. d. & m. d.

Screw machine, 6" Cleveland, Model "B", m. d.

Screw machine, Pratt & Whitney, cap. 1", b. d.

Shaper, 15" Potter & Johnson, b. d.

Shaper, 20" Steptoe, b. g., b. d.

Shaper, 24" Hamilton, heavy duty, b. g., b. d.

Shapers, 34" Cincinnati, b. g., b. d. (2)

Shear, alligator, No. 61 Carlin, 3" round high knife.

Shear, bar, Mesta 36"x18", m. d.

Shear, flying, Edwards, capacity 10 sq. in.

Shear, plate, 10"x21" United, gap 16", m. d.

Shear, squaring, No. 6-E Niagara, cap. 73"x3", m. d.

Shear, rotary, No. 10 Quickwork, 14 ga. 66" throat.

Slitter, gang, No. 2 Waterbury-Farrell, winder, b. d.

Slotter, 8" Betts, table 20" dia., m. d. (2)

Slotter, 18" Newton heavy duty, table dia. 47", m. d.

Slotter, 20" Sellers, table 40" dia., b. d.

Straight'er, strip & cut, No. 1 Schuster, 24"x3", m. d.

Welders, 150 amps, 300 and 500 amps, portable.

USED AND REBUILT MACHINERY

FOR SALE BY

B. D. Brooks Co., Inc.

119 Broad St. Boston, Mass.

Sheet metal working machinery, hand and power.
All types of new and reconditioned equipment.
Apron brakes, press brakes, shears, folders.
Bending rolls, corrugating rolls, forming rolls.
Punches, bead rollers, rotary machines, stakes, etc.

R. S. Armstrong & Bro. Co.

676 Marietta St., N. W., - Atlanta, Ga.

Bolt machine, 24" Landis, sgl. b. d.
Blower, No. 5 Buffalo Vol. b. d.
Compressor, 225, 12x10, 1-K horz. b. d.
Compressor, 16x18 CPT, horz. b. d.
Compressor, 17x9-3/4x12, Sullivan Class W-J3, b.d.
Drills 26" sta. hd. Silver, b.d. & C-O m. d.
Drill, 25" Norton, b.d. sl. hd.
Grinder, Cincinnati No. 1 cutter & tool, b.d.
Hammer, 25 lb. Little Giant, power, b. d.
Hammer, 1100 lb. Erie, Steam.
Keyseater, No. 2 M & M, b.d.
Lathe, 14"x8" Rockford, q. c. g., cone drive.
Lathe, 18"x10" South Bend q. c. g., t. a. m. d.
Lathe, 18"x24" Bradford, j. c. g., t. a.
Pipe machine, Curtis & Curtis, 24" to 8", b.d.
Planer, 30x30x16 Wheeler, b. d. one head.
Shaper, 20" Cincinnati, b. x. b. d.
Shear, Thompson bevel patch, b. d.
Shear, No. 2 Bethlehem circle, b. d.
Woodworker, Northfield.

Wm. C. Johnson & Sons Machy. Co.

1211 Hadley St., St. Louis, Mo.

Air compressors, 15 in stock.
Bolt threaders, 1", 1 1/2" & 2" Acme.
Boring mills, 6"-8", 44" Niles.
Boring mill, King 34", turret head.
Broach, 3A La Pointe of Hudson.
Drill, Natco 13 spindle, No. 1 taper.
Drill, No. 2 Fox, 6 spindles.
Drill, Moline hole hog, 5-sp. No. 4 Morse taper.
Drill, radial, 4' Fostick; 34" Mueller, 3' Reed-Prentice.
Drill, radial, 3' Cincinnati Bickford.
Drills, radial, Drillmaster, new.
Gear hobber, No. 3 Adams.
Grinders, 16"x20" and 6"x18" Landis.
Hammers, 500 lb. Beaudry, 75 lb. Bradley, 50 & 100 lb. Little Giant.
Lathe 15"x8" LeBlond, quick change g., taper attach.
Lathe, 16"x5" Greaves Kiusman, q. c. g.
Lathe, 18"x10" South Bend, quick change gear.
Lathe, 20"x10" Cisco, g. h., t. a., like new.
Lathe, 24"x14" Lehman, quick change gear.
Lathe, 31"x14" Schumacher & Boye.
Miller, Cln. production type, 67"x11" table.
Miller, No. 14 American.
Miller, No. 2 LeBlond plain.
Miller, No. 3 Cincinnati plain.
Miller, No. 2M Rockford universal.
Miller, 34" Rockford universal.
Pipe machines, 2"-4"-6"-8"-12"
Pipe machine, 2" Landis.
Planer, 30"x30"x14" Cincinnati.
Press, 92 lb. Toledo double crank.
Presses, No. 3, 2 & 4 Marshalltown.
Presses, 3, hydraulic pump & accumulator.
Roll, plate straightening, H. & J. No. 3, like new.
Shapers, 12"-16"-20"-24".
Punches, shears, bulldozers.
Testing machine, 100,000 lb. Riehle.
Toggle press, 407A Blum.
Large stock guaranteed electric motors. Any size.

FOR SALE BY

E. L. Klauber Machinery Co.

3221 Olive St. - St. Louis, Mo.

Gear hobber, No. 000 Schuchardt & Schütte.
Lathes, Cataract, two machine unit; 1" and 3" cap., with both screw machine and standard attach.
Lathe, 14"x8" Fay & Scott, cap bed, q. c. g., draw-in attachment, m. d. with G.E. Vari-sp. motor & conts.
Millers, No. OV B&S, No. 3 Burkes; W. & U.S. hd.
Saws, metal, band, Racine 2 sp., No. 2 Klemm, m. d.
Shapers, 14" Hendey, 16"x20" Ohio
Testing machine, Rockwell hardness, No. 5H-40.
Threading machines, Landis S.H., 14" and 2"
Turret Lathes, No. 1 & 2 Wood, td., No. 3 Adv. I. g. h.

D. E. Dony Machinery Co.

47 Laurelton Rd., - Rochester, N. Y.

Dieing machine, 60 ton H. & W.
Diamond boring machines, Coulter.
Hardening furnace, Surface Combustion Co.'s No. 350
Unit, pusher type, with quench tank and conveyor.
Mill, Ingersoll, 24"x24"x10", 3 heads.

Standard Machinery Co.,

347 Indiana Ave. Grand Rapids, Mich.

Ball burnisher, Baird No. 1, double barrel.
Drill, 25" Superior, sliding head.
Drill grinder, Sellers 3" capacity.
Gear cutters, Whiton 34" automatics, (2).
Lathe, 24"x8" Lodge & Shipley.
Lathes, Porter-Cable 9"x14" Mig., (2).
Planer, 36"x36"x10" American, m. d.
Roll formers, Kane & Roach, 2 sets spdles.
Shaper, 25" Smith & Mills, m. d.
Tapper, Anderson No. 40 Dial Feed Auto.
Welder, Thompson Spot 25 KW, foot operated.

Jones Machine Tool Company

Front & Pike Sts., Cincinnati, Ohio

LATHES.

18"x10" Hendey tie bar, q. c.
16"x8" Lodge & Shipley, q. c. bowl head.
20"x8" Lodge & Shipley geared head.
20"x10" Sidney q. c. bowl head, belt drive.
24"x16" S. Boye loose change.
20"x16" American belt drive, (standard change).
36"x14" Boye & Emmes, belt drive, std. chge.
SHAPERS.
30" Gould & Eberhardt back geared crank.
30" Rockford back geared crank.
24" American b. g. crank.

GRINDERS.

No. 1 LeBlond universal tool and cutter grinder.
No. 60 Heald cylinder with fixture.

RADIAL DRILLS.

3' American triple purpose, s. p.
4" Mueller radial, s. p.
8' Fostick, single pulley.
5' Bickford, single pulley.

MILLING MACHINES.

No. 2A Milwaukee single pulley drive.
No. 24 Fox cone drive.
No. 4 Hendey.

MISCELLANEOUS.

Punch presses, bolt and pipe threading machines
Cleveland s. a. automatics, hack saws, upright drill
presses, keyseaters, etc.

USED AND REBUILT MACHINERY

FOR SALE BY

Foster Machinery Co.

3982 Bluestone Rd.

Cleveland, O.

Buffer, 3 h.p. 3400 r.p.m., 230 volt.
 Bulldozer, Williams & White No. 4, double end.
 Bulldozer, Williams & White, No. 23.
 Compressor, tank & 3 h.p. motor unit.
 Drill, Footburt, 2" in steel.
 Drill press, 28" Barnes, sliding head.
 Forging roll, No. O.C. Ajax.
 Grinder, No. 60, Heald.
 Miller, vertical S. D. Becker, 40" rotary table.
 Planer, 30"x30"x8" Ohio.
 Punch, horizontal Cleveland, Style "T" motor drive.
 Punch, Long & Alstatter, 36" throat, 1 1/2" cap. arch jaw, motor drive.
 Sander, disc, flexible shaft.
 Saw, 6" Newton, cold.
 Saw sharpener, IIS Cochrane & Bly.
 Welder, 1/2" butt.

FOR SALE BY

Ogden R. Adams

264-6 State Street

Main 6374-5

Rochester, New York

FOR IMMEDIATE DELIVERY

Grinder, 6"x32" Norton plain,
 Radial drill, 4" Western, triple geared
 Shaper, 14" Gould & Eberhardt.

T. R. Wigglesworth Machinery Co.

5122 St. Clair St., - Cleveland, Ohio

Boring mill, 50" Bullard vert., 2 hds., m.d.
 Bulldozer, No. 9 Wms. White, m.d.
 Grinder, No. 3 Brown-Sharpe universal.
 Lathe, 36"x20" LeBlond, q.c.g., arr. m.d.
 Colburn wid. pattern, 72", v.b.m.

Marr-Galbreath Machinery Company

Air compressor, 9x8" Ing-Rand., E.R-1.
 Air compressor, 6x8" Duplex, Curtis, m.d.
 Air comp., 676 cu. ft. Ing-Rand, X.R.E. 3/60/440.
 Blowers, (furnace) No. 2 Knight; No. 3 American.
 Blower, pressure, No. 11-PB Am. 14375 cfm., m.d.
 Bolt threader, 1" Greenfield, m.d.
 Boring mill, 30" Bullard vert., threading attach., b. d.
 Boring mill, vert., 30" King, tur. hd., s. p. d.
 Brake, crimp and corrugating, 10"x16 ga. Keene.
 Brakes, apron, 10"x1/8" & 8"x12 ga. Chgo.
 Brakes, apron, 8"x16 ga. Tuttle, hand.
 Die filing machine, No. 2 Cochrane-Bly.
 Drill, hvy. duty, 24" Mechnica, No. 5 MT, m.d.
 Driller, horiz., 8 spindle Nat'l. Acme, No. 2 chucks.
 Drills, radial, 3" Dreeses, Simplex, cone.
 Drills, gang, 3 and 4 spindle, 1 to 4 MT.
 Exhauster, No. 35 Buffalo, outlet 12x14", m. d.
 Fan, ventilating, 24" American, m. d., 1/60.
 Forging machine, 1" Ajax, cont. motion, m. d.
 Forging mach., 1" Nat'l. cont. mot. Grip Wedge, m. d.
 Forging machine, 1 1/2" Acme, all steel, side shear.
 Gear pinion, No. 3 Sloan & Chase, auto. bench.
 Grinder, No. 2 Wilmarth & Marman surface, b. d.
 Grinder, drill, 24" Oliver, m. d.
 Grinder, portable surface, No. 6-OA, motor, 3/60.
 Grinder, univ. C. & R. No. 3 B. & S.
 Grinding spindle, Exello No. 39, bracket 5002.
 Hack saw, No. 5 Marvel, cap. 6x8", belt.
 Hack saw, 6x8" Peerless, for m.d.
 Hammers, 50 lb. Boss, No. 2, with dies, belted.
 Hammer, 50 lb. Single upright power, belted.
 Hammer, 60 lb. Bradley horiz. helve, b. d.
 Hammer, 75 lb. Beauty, power.
 Hammer, 800 lb. sgl. frame, steam.
 Hammers, S. F., steam, 1100 & 1500 lbs.
 Hammer, 2500 lb. Erie, Arch frame, steam.
 Hammer, 400 lb. Hils board drop (rebuilt).
 Hammer, 1000 lb. Chbg. steam drop, double frame.
 Hoists, Canton No. 1 portable.
 Hoists, 10-ton Exclid, 1/60/220 (2).
 Lathe, 11/16"x4" Artisan, q. c. g., s. p. d.
 Lathe, 14"x8" Monarch, q. c. g., m. d.
 Lathe, 16"x8" Advance, chuck, cone.
 Lathe, 16"x8" So. Bend, gap type, cone dr.
 Lathe, 17"x8" LeBlond, q. c. g., cone.
 Lathe, 18"x8" S. B. & E., chuck, t. a., cone.
 Lathe, roll, 44" Hyde Park, m. d.
 Lathe, 36"x20" Springfield, m. d., 230 v. d. c.
 Marking machine, No. 3 Noble & Westbrook.
 Miller, plain, No. 1 F. belted.
 Miller, No. 3 Rockford, hand, belt.

57 Water St.,

Pittsburgh, Pa.

Miller, No. 3 1/2 Fox, plain power feed, c.s.
 Motors, 15 h. p., West, 3/60/220-440/870 rev.
 Motors, 25 h. p., Allis-Chalmers 3/60/220/880 rev.
 Motors, 30 & 40 h. p., West, C.S. 3/60/220/870 rev.
 Nailing machine, No. 6 Morgan, 8-track, m. d.
 Nibbling machine, No. 1 Campbell, 6" thr. 3/16".
 Pinion cutter, No. 3 Sloan & Chase, capacity 1x1".
 Pipe machine, 4" Williams, cap. 1/2" to 4", m. d.
 Pipe machine, 8" Jarecki, cone or m. d.
 Pipe machine, 18" Wieland "Standard", m. d.
 Pipe machine, 402 Ost., motor 1/60, 2".
 Pipe & nipple mach., 1" Landis dbl. hd., b. d.
 Planer, 36"x24"x8" Niles, 1 hd., belt m. d.
 Press, foot, LeWhaite, wt. 400 lb., (4).
 Press, Horn, McSherry, steel, 1 1/2" str., Wt. 1000 lbs.
 Press, punch, No. 94 Consolidated, plain.
 Press, punch, Hydr. 150 ton Chbg str., m. d.
 Press, punch type, No. 94 Consolidated pl.
 Press, sgl. crank, 500 Toledo, 8".
 Punch, S. E., 36" Cleve. E.F. 12x1", A. J., dies.
 Punch & Shear, S. E. No. 7 L. & A., 5" th. cap. 8x8".
 Punch & shr., comb., No. 5 Buffalo, hand, cap. 1 1/2".
 Punch & shear, S. E., 6" th., No. 3 L. & A., rapid a.
 Punch, state & riveter, 72" Wickes, 7/8"x8", s. p. d.
 Punch, state & riveter; 80" Whiting, No. 6, s. p. d.
 Riveter, 3A, h. d., cap. 5/16", high speed, s. p. d.
 Riveter, 103 Grant, m. d., 2/60/220 v. cap. 5/16".
 Rolls, 30"x36" United, 2-rolls (for leather).
 Saw, metal band, No. 4 Atkins, cap. 12x18", m. d.
 Saw, friction, No. 9 Ryerson, 24" blade, m. d.
 Shaper, 15" Blount, single geared.
 Shaper, 16" Smith & Mills, m. d.
 Shapers, 21" Averbek cone.
 Shapers, 24" Milwaukee & American, cone.
 Shear, bar, No. 3 United, 24" blade, cap. 25" sq., m. d.
 Shear, 60"x8" L. & A. 5" gap, belt.
 Shear, Blocks & Blades 52"x8" cap. 1500 lb.
 Shear, throats, 10 ga. Marshalltown, m. d.
 Tapping machine, 1 1/2" Pratt & Whitney, b. d.
 Testing machine, 1000 lb. Olsen hyd. band.
 Tearing machines, 1000 lb. Economy, hand power,
 Transmission, Reeves No. 60-E (new)
 Turbines, 100 h. p. Westinghouse, 900 rev.
 Turret lathe, 2" P. & J., thread att. chuck, b. d.
 Turret lathe, 18"x8" Springfield, Fox Monitor.
 Turret lathe, 21" Gisholt, 3/4 hole, m. d.
 Turret lathe, 24" P. & J., 3/4 hole, cone.
 Turret-screw machine, 1"x15" F. & W. W. F., m. d.
 Upsetter, 1 1/2" Acme, all steel, for m. d.
 Welder, arc, 160 amp., a. c. (near new) (2).
 Welder, arc, 280 amp., a. c. Hampton (new).
 Welder, spot, 5 KVA., Eisler, 8" arms.

USED AND REBUILT MACHINERY

FOR SALE BY

The Reeve-Fritts Company

28 N. Clinton St., Chicago

Boring machine, No. 1 Barrett, cylinder.
 Drill, No. 3 Barnes horizontal, double head.
 Grinder, 72" Buffalo knife.
 Grinder, No. 2 Grand Rapids tool & cutter.
 Hammer, 100 lb. Mayer upright.
 Lathe, 27" x 10' Fifeild.
 Miller, No. 1 Cincinnati universal.
 Screw machine, 37" Cleveland automatic "A".
 Tapper, No. 1 Garvin vertical, 4".
 Turret lathe, 19" P. & W., geared head.

Riverside Machinery Depot

255 St. Aubin Ave., - Detroit, Mich.

AVAILABLE

Planer, 24" x 24" x 8' Cincinnati.
 Planer, 30" x 30" x 18' Gray, 2 heads.
 Tool Grinder, No. 2 Sellers universal.
 Drill, Rockford h. d., No. 8 taper.
 Grinder, No. 6 Gardner, m. d., 36" discs.
 Hand screw machine, No. 3 Foster, f.g.h., w.f.
 Honing machine, Hutto 2-spindle, m. d.
 Over 300 machines available.

FOR SALE BY

Faries Manufacturing Co.

Decatur, Illinois.

Thread-rolling machines, No. 46 Cameron, belt driven,
 serial Nos. 346 and 343, (2).

Chas. E. Lowe Co.

174 Pearl Street Hartford, Conn.

Automatics & Turret Formers No. 2 B. & S., (15).
 New Britain Gridleys, 18", anti-friction throughout,
 rebuilt, motor in base, serial over 23000 (2).
 Gridleys, 18" G. Timken spindles, rebuilt (2).
 Cleveland, 24" A, motorized, 5 hole turret.
 Cone, 18", 900 serial, excellent condition.
 Cleveland, 24" A, Gridleys, 24" & 48", s.s., belt.
 Gridley, 9/16" G, motorized.
 New Britain 1" x 5, 4 spindle motorized.
 Chucker, No. 452 New Britain, 4 spindle, motorized.
 Chucker, No. 24 New Britain, serial 5149.
 14x19 Fays. (4).
 Grinder, No. 15 Bryant chucking, internal.
 Grinder, No. 33 Baxter D. Whitney, internal.
 Grinder, No. 3 diamond surface, m. d. 16x36 mag. chck.
 Lathe, 44" x 18" Pratt & Whitney, taper att.

West Penn Machinery Company

Air compressors, 30 to 2500 cubic feet.
 Air compr. portable gas 1-R. 180 cu. ft.
 Blower, No. 4 Roots, capacity 2110 c. f. m.
 Bolt cutters, 14" & 3" Acme, b. d.
 Boring mill, 42" Bullard, 2 heads.
 Boring mill, 72" Niles, 2 heads, b. d.
 Boring mill, 10' Niles, 2 heads, b. d.
 Bulldozers, Nos. 3, 4, 5, 6, 7, 8, & 30.
 Brakes, 10' - 14 ga., D. & K., hand.
 Crusher, jaw, No. 4 Champion, b. d.
 Die sinker, No. 2 Pratt & Whitney, b. d.
 Drill sharpener, Ing. Rand "Leyner", 1 1/2".
 Drill, radial, 2' and 3' Simplex, m. d.
 Drill, radial 6 Reed-Prentice, single pulley drive.
 Drills, upright 10" to 36".
 Engine, gas, 30 horse power Bessemer.
 Flanger, McCabe, 4" capacity, dies.
 Gear cutters, 11", 18" & 24" Gleason.
 Gear tester, bevel 18" Gleason.
 Grinder, "Kwick-Way" all purpose, m. d.
 Grinder, drill, No. 31 Oliver, 1 1/2", m. d., 220/3/60.
 Grinder, internal, No. 60 Heald, b. d.
 Grinder, knife 10' Bridgeport, m. d.
 Grinder, roll, Farrell 20" x 76".
 Grinder, surface, No. 1 Diam. 14x24, mag. chuck, m. d.
 Grinders, D. E. 3-3 & 5 h. p., 220/3/60.
 Hammers, 50 lb., 75 lb., 100 lb., 200 lb. Upright.
 Hammers, Nos. 2-B, 3-B, 4-B, 5-B, Nasel.
 Hammers, steam, forging & drop.
 Keyseater, No. 9 and No. 2 Mitts & Merrill, b. d.
 Lathe, bench, 11" x 24" South Bend, m. d.
 Lathes, speed, 11" and 18" Blount, m. d.
 Lathe, brass 18x6", friction head, power feed, b. d.
 Lathe, 14" x 6" American, t. a., b. d.
 Lathe, 20" x 10' Springfield, t. a., m. d.
 Lathe, 28" x 10' Chard, t. a., g. c. s., d. b. g., b. d.
 Lathe, 13' x 16" Schumacher Boys, g. c. s., belt drive.
 Lathe, Lo-Swing, 6" x 60", s. p. d.
 Lathe, roll, 42" x 20" United, m. d.
 Lathes, turret, Nos. 1, 2 and 3 W. & S., b. d.
 Lathe, wheel, 78" x 24" Bement, motor drive.
 Locomotive, gas, 6 ton Milwaukee, 36".
 Locomotive, steam, 50 ton Baldwin, std. gs.
 Miller, plain, No. 6 Stentop, table 30x3, b. d.
 Miller, Lincoln No. 25 Kempamith, b. d.
 Miller, universal, No. 4 Garvin, b. d.

1210 House Building,

Pittsburgh, Pa.

Miller, vertical, Burke, table, 16x36, b. d.
 Mixers, Sprout-Waldron, batch & liquid.
 Nibbler, No. 1 Campbell 3/16" 6" gap, m. d.
 Pipe mch., 2", 4", 6", 8" & 12" Landis-Oster-Williams.
 Planer, 20" x 36" x 12" Cincinnati, 2 hds., b. d.
 Planer, plate, 25' Covington, m. d.
 Press, forging, 150 ton United, steam hyd.
 Presses, O.B.I., No. 19 Bliss & No. 4 Niagara, 2" str
 No. 85 Toledo, bed 30x18.
 Press, screw, No. 87 Niagara, hand power.
 Press, arch, No. 30 Bliss, roll feed, b. d.
 Press, strip feed, No. 31-C McDonald, b. d.
 Pumps, centrifugal 6", 4", 1", motor drive.
 Punch, E.F. Cleveland, 36" throat, 18" thru 1".
 Punch, multiple, 32 E. W. & W. 16 1/2".
 Punch, horiz., No. 7 Kling, m. d., 220/3/60.
 Riveters, air, hammer, spinning.
 Rolling mill, cold 9" x 18" motor drive.
 Saws, friction, Nos. 2, 3 & 4 Ryerson motor drive.
 Saw, cold, 48" Newton motor drive.
 Saw, metal band, Laidlaw, m. d.
 Shapers, 16", 20", 24" & 36" Gould & Eberhardt.
 Shears, alligator, 14", 2", 3", 4" & 6".
 Shear, Angle 6x8x4 Long & Allstatter, m. d.
 Shear, 42" x 18 ga. Niagara, b. d.
 Shear, Niagara 42" x 14 ga., belt drive.
 Shear, Stoll 60" x 16", motor drive.
 Shear, 10', 18 ga. Niagara, b. d.
 Shear, 64" x 1" H. & J. 36" gap, m. d.
 Shear, plate, 48" x 8" Ironton, 24" gap, m. d.
 Shear, circle No. 3 Bliss, 40" x 20 gauge.
 Shear, guill., No. 2 H. & J. 24" rd. b. d.
 Shear, guill., 4' x 24" Newbold, b. d.
 Slitter, gang, 36" Yoder motor drive.
 Slitter, gang, 36" Bradock, belt drive.
 Slotter, 6" & 24" Newton.
 Straightener, 12" x 18" Shuster, b. d.
 Straightener, 12" x 18" Shuster, b. d.
 Straightener, 48" Aetna-Standard, 17 roll 24", m. d.
 Straightener, 60" McKay, 17 rolls 48", m. d.
 Straightener, 64" x 1" Berlich, m. d.
 Testing machine, 400,000 lb. Riehle, b. d.
 Thread rollers, W-F No. 29-8".
 Tumbling barrel, 34" x 45", belt drive.
 Upsetters, 1" to 4".
 Welder, spot, 13 K. V. A.

USED AND REBUILT MACHINERY

FOR SALE BY

Failor-Strafer Machinery Co.
132 Liberty St., - - New York, N. Y.

Boring mill, 66" N.B.P. vert., 2 hds., arr. m.d.
 Boring mill, 42" Bullard vert., 2 hds. 3 jaw chuck table.
 Drill radial, Amer. 3" sens., tapping attachment.
 Gas furnace, No. 4 American, door opening 8"x14".
 Grinder, 24" Marschke, swing frame, arr. m.d.
 Grinder, Oliver 4 wheel wood tool grinder.
 Grinder, 16"x24" Landis pl., self-contained, m. d.
 Lathe, 42"x28" Davis, m. d.; 32"x14" Davis.
 Lathe, 26"x16" Bridgeford, 3 step cone, taper attach.
 Lathe, 26" x16" Walcott, 3 step cone, d. b. g.
 Lathe, 26"x46"x18" McCabe, double spindle.
 Lathe, 32"x11" American, triple geared, taper att.
 Lathe, 36"x14" Lodge & Shipley s.p.d., taper.
 Miller, No. 2 Kempsmith plain.
 Miller, 48" Newton continuous rotary, 2 spdl., m.d.
 Pipe machines, 8" Wieland, 4" Williams, m. d.
 Shear, 12" x 3/16" cap. Geo. Ohi Power squaring shear.

Wiener Machinery Co.
237 Centre St., - - New York City

Gear shaper, 6" Gleason, m.d., late type.
 Grinder, No. 2 B&S universal.
 Lapping mach., No. 1F, Norton, m.d.
 Lathe, 20"x18" Reed q.c., instantaneous m.d.
 Shaper, 32" G&E, Invincible late type, m.d.

Factory & Mill Supply Co., Inc.
176 Federal St., - - Boston, Mass.

Boring mill, 76" Bullard vert., 2 swivel hds., m.d.
 Planer, 48"x48"x12" Bette, 3 heads, m.d.

B B Machinery & Tool Company
503 Locust Street Trafficway,
Kansas City, Missouri.

Boring mill, 48" Niles vertical.
 Drill, radial, 48" Dresses.
 Gear generator, Gleason bevel.
 Lathe, 34"x12" Pond, quick change.
 Planer, 30"x30"x16" Woodward-Powell.
 Trip hammers, 75 lb. and 100 lb. Beaudry.

Bleser Machinery Company
209 N. Sixteenth St., - Springfield, Ill.

Drill presses, 30" to 34".
 Lathe, 31"x8" LeBlond, q.c., r.b., 32".
 Planer, 24"x24"x4" Pond.
 Shaper, 32" American.
 Slotter, 12" Bement, 36" rot. table.

Alex Zeeve
2282 Woolworth Bldg., New York, N. Y.

Boring mill, horizontal, 7" bar.
 Boring mill, 34" Rogers, vertical, s.p.d.
 Drills, radial, 4" Dresses, 3" American.
 Flanger, 4" McCabe with lot dies.
 Lathes, 53"x34" Nicholson-Waterman, geared faceplate drive, 24"x11" Lehmann, 16 speed geared hd., 29"x16" Walcott, q.c.g., t.s., 24"x16" Whitcomb-Blaisdell, q.c.g., t.s., 16"x8" Walcott, 12 speed geared head.
 Keyseaters, No. 1 and No. 2 Baker, No. 6A Mitts & M.
 Miller, No. 3B Knight vert. miller, motor in base.
 Planer, 48"x48"x16" Sellers, 3 heads.

ALSO MANY OTHER TOOLS.

FOR SALE BY

The Elyria Belting & Machinery Co.
Elyria - - - - - Ohio

Grinder, surface, 14" Pratt & Whitney vertical, with rectangular magnetic chuck, working surface of table 12"x36", table travel 26".
 Keyseaters, No. 1 Mitts and Merrill, No. 2 Baker.
 Press, Ferracute geared incline.
 Press, toggle, No. 1648 Toledo, stroke of slide 18", opening in bed 14" diameter.

Jas. Cunningham, Son & Co.
Rochester, N. Y.

No. 60 Heald cylinder Grinders, (2).

PUNCH PRESSES

D. H. Prutton Machinery & Tool Co.

5295 West 130th Street, Cleveland, Ohio

FOR SALE — GOOD TOOLS

Automatic, No. 0 B. & S., No. 2929 \$1450.
 Drill, 2 Spd. Cleveland H.S., B. B., No. 2
 MT Tapping Att., on each.... \$300.
 Drill, 2 spd. Allen H. S. B. B. 14" Swing,
 No. 2 M. T. \$300.
 Gear Hobber, No. 5A Lees Bradner, Cap.
 14"x4 D. P. \$400.
 Gear Cutter, No. 6 B. & S., Cap. 60"x11"
 table \$3500.
 Grinder, 18"x50" Sterling, Motor Driven,
 Rebuilt \$3500.
 Grinder, American, Drill, cap. 1/4 to 2 1/4"
 with pump \$75.
 Lathe, 15"x8" LeBlond, Q. C., M. D.,
 Taper \$800.
 Lathe, 16"x6" Johnson, Q.C. Belt Drive \$500.
 Lathe, 20"x8" Amer., Q.C., Pan Bed \$2000.
 Planer, 36"x36"x12" Woodward-Powell, 2
 Heads, B. D. \$2000.
 Press, No. 16 Robinson, Horn, adj.
 table \$350
 Scr. Mach., No. 0 B&S, Hand, 1/4"x2 1/4"
 Rebuilt \$450.
 Threader, Namco, 2-sp., 1/4" Cap.... \$200.
 Miller, No. 2, Craftman Rotary \$750
 Miller, No. 2 P. & W., Power Feed, 5x24
 Table \$300.
 Roller Die Mach., 9 spindles, 2" dia.
 Bearings \$1500.
 Scraper, Anderson, Motor Drive.... \$500.
 Scr. Mach., No. 2 W. & S., Power and
 Wire Feed \$1150.
 Tapper, 1/4" Hart-Hageman, Auto.... \$250.
 Flame Cut., Hancock 01, 18x18, Gas. \$200.

BANSBACH MACHINERY CORP.

3845 West Madison Street, Chicago
 Kedzie 0212

USED AND REBUILT MACHINERY

WANTED

TAPS-TWIST DRILLS-FILES CUTTERS-ENDMILLS-SAWS HACK SAW BLADES

WE WILL BUY YOUR SURPLUS TOOLS

WESTERN TOOL EXCHANGE

18 N. Halsted Street, Chicago, Illinois
SURPLUS BOUGHT AND SOLD

CLEVELAND AUTOMATICS

2" Model "C"; also 3-3/4"
Model "A", Single Spindle,
Belt Driven.

One No. 3 26" B. & S. Gear
Cutting Machine.

The Cincinnati Lathe & Tool Company
Marburg Ave., Oakley, Cincinnati, Ohio

PRICED RIGHT FOR QUICK SALE

Boring Bar 3" Beaman & Smith Horizontal, Floor type

Milling Machine, No. 4 Cincinnati
Metal Band Saw, Houston & Richardson,
9x10, motor driven

PLANERS

36"x36"x16'6" bed, Gray, 2 heads on
rail, pulley drive
28"x28"x8' Hamilton, 1 head on cross
rail, pulley drive

Pipe Threader, Cox & Son 2-8" cap., for
motor drive, but no motor.
Mills, Becker Lincoln type, overarm dia.
3-1/4", 9x29 1/2" table

Boring Mill, 30" Rogers vertical,
swing 35 1/2", all geared feeds

Drill Press, Allen 4-spindle, 8" overhang,
11" between spindles.

GLOBE MACHINERY COMPANY
602 W. Lake St. Chicago, Ill.

1000 MACHINES FOR SALE

Lathes, Milling Machines, Shapers, Boring
Mills, Slab Millers, Drills, Punch Presses,
Squaring Shears, Wire Forming & Cutting
Machines, Bolt, Nut and Rivet Machinery.

At Reasonable Prices

National Machinery Exchange
130 Mott Street New York City

OVER 30 YEARS EXPERIENCE IN REBUILDING MACHINERY

VERTICAL BORING MACHINES

- 34" Rogers, turret head on cross rail
- 36" Bullard Rapid Production
- 36" Colburn, tur. head on cross rail, M.D.
- 54" N.B.P., 2 swir. hds. on cr. rail, D.C., M.D.

RADIAL DRILLS

- 3' Mueller Round Column, gear box
- 4' Bickford Universal

GRINDERS

- 16"x18" Landis Plain
- Two—6"x20" Type "A" Pl. Hydraulic, M.D.
- 12"x18" Cincinnati Plain, M.D.
- 16"x48" Landis Crank
- 16"x50" Norton Type "A" Plain
- No. 50 Heald Cylinder, M.D.
- No. 55, No. 60 and No. 65 Heald Cylinder
- No. 1 Brown & Sharpe Universal
- No. 2 Landis Universal, three M.D.
- No. 2 Taft Pierce Universal
- 8" Arter Rotary Surface
- 14" Pratt & Whitney Vertical Surface
- Two—6"x10"x30" Norton Type "S" Surf., M.D.
- 6"x10"x36" Norton Hydraulic Surface, M.D.
- 24"x36" Landis Roll

LATHES

- 14"x6" American Geared Head, S.P.D.
- 14"x8" Monarch
- 16"x8" LeBlond, taper attachment
- 18"x8" Cisco, Taper attachment
- 18"x8" Pratt & Whitney
- 24"x10" Lodge & Shipley
- 20"x12" Lodge & Shipley, taper attachment
- 42"x12" Pittsburgh

- 20"x14" Lodge & Shipley
- 26" 48"x20" McCabe Two-in-One

MILLERS

- Several 16" and 22" Briggs Type "A"
- Several 42" and 72" Briggs Type "B"
- No. 10 Bilton Productomatic
- 12" Pratt & Whitney Auto.
- 16"x14" Pratt & Whitney Thread
- 6"x18" Pratt & Whitney Thread
- 6"x30" Pratt & Whitney Thread
- Several No. OY Brown & Sharpe Plain
- No. 1H Milwaukee Plain, M.D.
- No. 2Y Brown & Sharpe Plain
- No. 2 Kennsmith Plain
- No. 2 Taylor & Fenn Vertical
- No. 2 Brown Sharpe Vertical
- Several—No. CS Becker Cont. Verticals
- No. AB Becker Vertical
- No. 5B Becker Vertical
- No. 6 Becker Vertical
- No. 1 Kennsmith Universal
- No. 2B Hendey Norton Universal

SCREW MACHINES

- No. 00 Brown & Sharpe Full Auto.
- Several—No. 00 B. & Sharpe Turret Formers
- No. 0 Brown & Sharpe Full Auto.
- Several—No. 0 B. & S. Turret Formers
- No. 2 Brown & Sharpe Cut-off
- No. 4 Brown & Sharpe Auto.
- 2" Cleveland Model "M", M.D.
- 5 1/2" Cleveland Model "A", M.D.
- 7" Gridley Model "P"
- 9/16" Gridley Model "G"
- 1 1/4" Gridley Model "C"

J. L. LUCAS & SON, INC.
3 FOX ST. — BRIDGEPORT, CONNECTICUT

CONSIDER GOOD USED EQUIPMENT FIRST!

IMMEDIATE AVAILABILITY AND DELIVERY ARE IMPORTANT FACTORS

AIR COMPRESSORS

245 cu. ft. 10"x10" Inger-Rand
Class ER1, M.D.
368 cu. ft. 12"x10" Inger-Rand
Class ER1, M.D.
528 cu. ft. 14"x12" Inger-Rand
Type ER1, M.D.
1574 cu. ft. 22"x13"x16"
Worthington B. D., 100 lbs.
Pressure
2090 cu. ft. 15/30x27/16"x24
Worthington Engine Driven.
90 lbs. Pressure

BENDING ROLLS

10' Bertch Initial Type Plate
Bending Roll capacity 14" Pl.
Drop End Housing, motor driv.
—Including D. C. Motor
12' Niles Pyramid Type, M.D.
Capacity 1" Plate
16' Bertch Pyramid Type, cap.
3 plate, direct motor drive
20' Covington Initial Type, M.D.
Capacity 1" Plate

BORING MILLS—VERTICAL

90" Ford, Motor Driven
BRAKE—LEAF TYPE
6' Dreis & Krump, "Chicago"
No. 167, Motor Driven. Capacity 3"

BRAKES—PRESS TYPE

12' Ohl. B.M.D. Cap. 3" Plate
8'6" Ley & Navarrath, M.D.
Capacity No. 10 Ga.
10' Geo. A. Ohl, M.D. Capacity
No. 10 Ga.

BULLDOZERS

No. 7 Ajax Motor Driven. Face
of crosshead 12"x76" Strk 16"
No. 297 Williams-White Motor
Drive, Face of Crosshead 20"
x90", stroke 24"

CRANES—OVERHEAD ELECTRIC TRAVELING

5 ton Bedford	35'6"
Span 220/3/60 A.C.	
5 ton Niles	48'1"
Span 220 Volt D. C.	
5 ton Shepard	75'
Span 220 Volt D. C.	
5 ton Whiting	91'
Span 220 Volt D. C.	
5 ton Northern	100'
Span 220 Volt D. C.	
10 ton Whiting	27'43"
Span 440/3/60 A.C.	
10 ton Niles	50'
Span 220 Volt D. C.	
10 ton Case 33" Span A.C.	
10 ton Northern 46" Span D.C.	
15 ton Toledo	27'6"
Span 440/3/60 A.C.	
20 ton Northern	65'
Span 220 Volt D.C.	
25 ton Niles	30'
Span 220 Volt D.C.	
35 ton F & H	38'4"
Span 220 Volt D.C.	
40 ton Northern 60" Span D.C.	
70 ton O. E. T.	80'
Span 220, 440 A.C.	
CRANE—GANTRY	
24 ton F & H	50'
span 220 Volt A. C.	

CRANE TROLLEYS

2—40 ton Shaw Trolleys with
auxiliary hoists, cab complete
with controls for 4 motors

DIE CUTTING MACHINE

Type BL 2416 Keller Automatic
Die Cutting Machine complete
with electrical equipment, ac-
tual service about 1 year

DIEING MACHINE

25 ton Henry & Wright
FORGING MACHINES
1" to 7" Ajax, National, Acme,
Steel Prime

FURNACES

3 ton Pittsburgh Electric Steel
Melting Furnace. Complete
with Transformers
9000 lb. Swindell Electric Melting
Furnace. Complete with
1800 KVA 22,000/3/60 Trs.
10 T. No. 5 Heroult Slag Melting
Furnace. Complete with
7500 KVA 11,000/3/60
Transformer New

HAMMERS—BOARD DROP—STEAM DROP—STEAM FORGING

800—8000 lb. Chambersburg,
Billings & Spencer, Eric, N-B-P
HAMMERS—NAZEL
No. 3B Nazel Hammer M.D.
Capacity 4" Square
LATHE—ROLL
48"x21'6" Standard Engr. Co.
Roll Lathe, B.D. Handles rolls
30"x10"

PLANKER—OPEN SIDE

60"x48"x38" Liberty Three
Head, Motor Driven

PLANKER—PLATE EDGE

16' Southwark, Arr. for M.D.
Equipped with Pneumatic Jacks.
Capacity 1" Plate

PRESSES—HYDRAULIC

300 ton Chambersburg Self-Contained Four Column Hydro-
Pneumatic Press, 12" dia. of
ram, 18" stroke, 49" Bet. Col.
500 ton United Engineering and
Foundry Company. High Speed
Hydraulic Forging Press, Four
Column Type
760 ton Southwark Vert. Press,
20" Stroke, 411"x10" Bet. C.

PRESSES—SINGLE ACTING

—STRAIGHT SIDE
No. 71B Bliss Dbl. Crank, Tie
Rod Construction, 13" Stroke,
60" Between Uprights
No. 16 Bliss Dble. Crank Tie
Rod Construction, 17" Stroke,
87" Between Uprights
No. 65 Toledo 60" Stroke, 27"
Between Uprights

PRESSES—DOUBLE ACTING

—TOGGLE
250 ton Birdsboro, Tie Rod Con-
struction, 18" Stroke of Blank-
holder, 36" Stroke of Slide,
42"x42" Area Blankholder.
Equipped with Marquette Hydr.
Cushions
No. 4 Bliss, Tie Rod Construc-
tion, 10" Stroke of Blank-

holder, 14" Stroke of Slide,
34"x31 1/2" Area Top of Bed
PUNCHES & SHEAR COMBINATION

No. 4 Hilles & Jones Double
End, M.D. 48" Throat, Capacity
Punch 1 1/2" through.
Each end of machine equipped
with Lysolm Table
No. 6 Beatty Double End, M.D.
16" Throat, Capacity Punch
1" through 1"
Hilles & Jones Punch, Sle. End,
M.D. Thr. 60" Cap. Punch
2" through 1 1/2" with Lysolm
Table

Type G Cleveland Single End,
Arr. for M.D. 12" Throat, Capacity
Punch 2" through 1"
Lysolm Double End, M.D. 44"
Throat, Capacity 1 1/2" through
1". All steel

Type G Cleveland Single End,
Belted Motor Drive, 72"
throat, Cap. punch 2" thru 1"
ROLLS—ANGLE BENDING
4"x4"x1" Bertch Initial Type,
Drop End Housing, Motor Driv.

ROLL—CORRUGATING

CURVING
10' Bertch Initial Type, Belt
Drive, Capacity 3/16". 2.66
Corrugations

ROLL—TAPER FORGING

No. 1 Ajax, Belt Drive
ROLLING MILLS
10"x16" V.E. & Co. Single Stand

Two High

12"x15" Mackintosh Single Stand

Two High

12"x20" Philadelphia Single

Stand Two High

12"x36" Lewis Single Stand

Two High

14"x42" Garrison Lead Mill,

Single Stand Two High

16"x19" Waterbury Farrel Four

Stand Two High

16"x20" Waterbury Farrel Single

Stand Two High

34"x76" Farrel F. & M. Co.

Two Stand Two High

9" Belgian Type Bar Mill, 2

Stands 3 High

2 Stands 2 High

16" Garrison Bar Mill, 2 Stands

3 High

10" Morgan Bar & Skep Mill,

2 Stands

24" Mackintosh Bar Mill, 2

Stands 3 High

15 1/2"x46 Aetna St. Engr. Co.

Tube Mill Single Stand 2 High

23" Cold Roll Tin Plate Sheet

Mill

24" Cold Roll Tin Plate Sheet

Mill

30" Morgan Billet Mill Three Hi

SHEARS—BAR

Mesta Guillotin Type Steel Frame,

Arr. for M.D. Capacity 6"

Square, 26" Between Uprights

SHEAR—SQUARING

72" Hilles & Jones No. 3 Belt

Drive Capacity 1 1/2" Plate

**Entire Surplus Manufacturing Equipment Inventories Purchased.
Appraisals. Liquidations. Consulting Engineering Service.**

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NEW YORK

30 CHURCH ST.

PH. CORTLAND 7-3437-3438

CABLE ADDRESS: RITTERBUSH, NEW YORK

Modern Machine Tools for Sale

- 28"x12" Schumacher & Boye Lathe, cone drive, double back gear, quick change gears
- 21x10' LEBLOND Heavy duty Engine Lathe, double friction back gear, quick change gear box with self contained motor drive 220—60—3 ph.
- No. 5 Foster Turret Lathe, equipped for bar work, power feed to turret, hand feed to cross slide, chuck capacity 1½"
- No. 6 WARNER & SWASEY double friction back geared turret lathe, power feeds to turret and to cross slide
- 2—24" STEINLE turret lathes, s.p.d. Power feeds to turret and to cross slide, hole through spindle 6¼"
- No. 1 MILWAUKEE (KEARNEY & TRECKER) MFG. TYPE PLAIN MILLER s.p.d., working surface of table 37½"x9½"
- 1½B special MILWAUKEE (KEARNEY & TRECKER) PLAIN MILLER double overarm, motor drive, all power feeds to table, working surface of table 45½"x11½"
- No. 4 CINCINNATI HIGH POWER PLAIN MILLER, high power type, c.d. double back geared, working surface of table 64½"x16½"
- No. 2 KEMPSMITH PLAIN MILLER, built in motor drive, all geared feeds and speeds, working surface of table 45 x 10"
- No. 1½ BROWN & SHARPE Universal Miller, c.d., back geared, Spiral dividing head, vert. milling attach., working surface of table 33" x 7"
- No. 2 KEMPSMITH Universal Miller, built-in motor, all geared feeds and speeds, with universal Spiral divid. head, working surf. of table 45" x 10"
- No. 1 Ohio Universal Miller, s.p.d., arranged for motor drive with 220—60—3 phase motor, all geared feeds & speeds, work. sur. of tbl. 39¼"x8½"
- Model 3V TOLEDO HIGH POWER VERTICAL MILLER, s.p.d., all geared feeds and speeds, working surface of table 56"x14", machine new in 1925
- 32"x22"x10' Ingersoll Planer type miller, fixed rail, 3 spindles
- No. 12 Pratt & Whitney 2 spindle profiler, geared spindles, work. surf. 12x15"
- 2—No. 1 Garvin 2 spindle profilers, working surface 12 x 15½"
- No. 14 Brown & Sharpe Plain Cylindrical Grinder, 10" swing, 18" grind. lgth.
- No. 11 Brown & Sharpe Plain Cylindrical Grinder, 3—motor-driven
- 10x36" Landis Self Contained Plain Cylindrical Grinder
- 16x72" Cincinnati Universal Grinder, 3 motor drive
- 12x36" Cincinnati Universal Grinder, 3 motor drive
- No. 260 Heald Rotary Surface Grinder, with 16" magnetic Chuck
- No. 14 Pratt & Whitney Vertical Surface Grinder, belted motor drive, with motor and magnetic chuck, working surface of table 40x12"
- 20" Rockford Shaper, s.p.d.
- 2—No. 3 Thiel Precision filing and saw. machine, m.d., 220—60—3 ph. mtrs.

Laurens Bros., 500 Peoples Bank Bldg., Cincinnati, Ohio

Parkway 3315

• UNUSUAL TOOLS •

SOLD WITH AN ABSOLUTE GUARANTEE OF SATISFACTION

Automatics

Cleveland, Model A, B, C, 1 1/4" (13).
Cleveland, Model C, 2" (2).
Cleveland, Model A, 2", S.S. (3).
New Britain 6 sp., 1" m.d. Cutoff.
New Britain Chuckler, No. 24.

Drills

2, 3, 4 spdle. H & W, Allen, Lal.-G.-Avey (33).
4 sp. No. 2 Colburn, No. 3 M.T. (2).
3' Amer. Hi Sp. Rad., motor on arm.
Pratt & Whitney dble. end, m.d. & m.
Moline Hole Hog, various sizes, (5).
Leland Gifford, 2 spdle., p.f.
Fox, Mult. Spdle., with tapp. att. (4).
No. 4B sgle. spdl. Edlund B.B. Tapper & Drill,
2 motors

Gear Equipment

No. 326 B. & S. Gear Cutter, m.d. & m.
No. 36 ST G. & E. Auto., 4 spdl. Gr. R., m.d.
No. 5A Lees-Bradner Gear Hobbers, (3).

Grinders

No. 3 Bryant Chucking.
No. 15A Bryant Chucking, Internal and Face.
No. 60 Heald Internal, c/s.
20" Badger Face, hyd. feeds, trav. of tble. 44".
No. 34 Van Norman Internal.
No. 3 Landis Univ. with c/s, int. att.

24"x16" Prentice Lathe, geared head, taper attachment, spd.

Williams & White Gear Cutter, capacity including gears up to 96" diameter x 52" face

No. 132 Arter Drum Type, m.d. (2).
Norton Model B Tur. type, m.d. (2).
No. 126 Gardner double spindle opposed type,
motor driven, hydraulic feed.
Nos. 6, 12A, & 20 Bryant (12).
12" and 16"x36" Cinc. Pl. Cyl., (2).
No. 2 Oakley Tool & Cutter, c/s.
No. 2 Norton Tool & Cutter, 4"x5".

Lathes

Nos. 5A, 6A P & J Auto., m.d.
Fay Automatic 14" standard.
16"x6" Monarch, grd. hd, m.d. & m.
16"x6" Bradford, t.a., m.d. & m.
Lo-Swing, 60" bet. centers, 8" sw., (2).
18"x7" American, grd. hd.
21" & 24" Gisholt Universal Turret.
3x36 J & L Flat Turret, s.p.d.

Mills

No. 5 Becker Brainard Horiz. Mill.
No. 21 Brown & Sharpe Prod., s.p.d.
No. 3V Kent O., pow. fd., m.d. & m., Reeves dr.
Nos. 1, 2 & 3 Craftsman Rot. Prod.
54" Ingersoll Rotary, 3 head, m.d.
66" Newton Rotary, m.d.
No. 1 Kempsmith Universal.
No. 1 1/2 Cincinnati Plain, c/s.
Model AB Becker, m.d. & m.

Miscellaneous

Balancer, 18" Gls. Stat., a. m.d., 4-sp. head.
Balancer, 18" Gisholt Static Vert.

Boltcutter, 2 sp., 3/4" cap. Landis ld. scr. att.
Broach, V-18 American.
Broach, No. 4 LaPointe.
Chip Separator, McKenzie, m.d.
Core Blower, No. 6 Demmler, (3).
Die Sinker, No. 2 Pratt & Whitney. ...
Die Sinker, No. 8 Billings & Sp., m.d. & m.
Filing Mach., Reed Prentice Precision.
Header, No. 3 Manville Solid Die, sgle. strk.
Pipe Threader, No. 3 Wms., m.d. & m., 6" cap.
Polishers, U. S. Elect. Tool, m.d. in base,
4-brg., h.d. type, (16).
Punch, Model ID Cleveland Single End, m.d.,
cap., 2 holes, 1 thru 1 1/4" 36" thr., lat. type.

Rivet Heaters, Berwick (4).
Saw, Model "J" Doall, m.d.
Saw, 6x6 Racine Hack.
Shaper, 24" Cincinnati, b.g.
Shaper, 18" American Hydraulic.
Shaper, 16" American Heavy Duty, m.d. & m.
Thdr., No. 3 Manv., dble. spdle., a. hop. ds.
Threader, Rick & Sch. Horiz. with auto. index.
Truck, 3-ton Automatic Low Lift.
Truck, Elwell Parker Elect. Mule.
Wire Str., 3/4" Shuster, ext. for cut. to 20' lg.
Wire Str., 3/16" Shu., ext. for cut. to 20' lg. (5).

Planers

24"x24"x6" American.
30"x30" Cin., m.d. & m., 10' table, 2 rail hds.
36"x60"x14" Amer. wid. to 60", rail, inside hd.

Presses

No. 55 1/2 Toledo Tie Rod, with dble. roll fds.
No. 58 Toledo, S.S., Single Cr.
Newton Spotting, m.d., 108" bet. uprights
No. 52 Toledo Arch, 29x29 bolster.
No. 4 Loshbough Jordan.
No. 63 Michigan S.S.
No. 61 Cleve., O.B.L., G.M.D.
No. 5 Canco, 8" str., S.S., Bk. Grd., m.d. & m.
No. 24 Toledo cam draw, m.d. & m.
No. 4A Bliss sw. adj. table, m.d. & m.
25 ton Henry & Wright with dble. roll feed.
P-2, P-3, P-4 Ferracule, m.d. (12).
DG-53 Fer., S.S., S.C., B.G., G.M.D.
Nos. 3, 4, 5 Bliss Consol., m.d.
No. 6C Rockford dble. cr., S.S.
No. 173B Cons., O.B.L., D.C., 5" str., 9 1/2" aht
ht. Jarecki Screw.

Shears

6' 10 ga Bertach.
No. 696 Niagara, 8' 10 ga., m. d. & m.
10' 14 ga. Streine.
1- 16 ga. Kutscheid, m. d. & m.
10' 3/4" Pextio Gap late type, m.d. & m.

Upsetters

1" National, steel bed.

AND A COMPLETE STOCK OF FINE UP-TO-DATE EQUIPMENT

HARVEY GOLDMAN AND CO.

10571 GRATIOT AVE. DETROIT, MICH.

REBUILT & GUARANTEED MACHINES

BORING MILLS—horizontal:

- 2½" Niles Knee Type
- 4-¾" Niles Knee Type Circ. Table
- 4" Betts Knee Type

BORING MILLS—vertical:

- 84" NBP Heavy Duty M.D.
- 42" NBP Standard, M.D.
- 42" Colburn Heavy Duty, M.D.
- 42" Bullard P.R.T., M.D.
- 36" Bullard Rap. Prod., Side H.
- 24" Bullard Rap. Prod., Side H.

ENGINE LATHES:

- 48"x36" Fifiield Triple-geared
- 42"x30" Johnson Geared Head
- 36"x24" Bridgeford H.D. M.D.
- 20"x14" Cisco, Geared Head
- 20"x14" Walcott, Geared Head
- 20"x10" LeBlond, Geared Head
- 20"x10" American, Geared Head
- 18"x 8" American, Geared Head
- 16"x14" Lodge & Shipley, M.D.
- 14"x10" Hendey, Geared Head
- 14"x 6" Prentice, Geared Head
- 10"x 5" P. & W. Prod. Lathes

GEAR CUTTERS:

- 60" Gould & Eberhart, M.D.
- 72" Gould & Eberhart, M.D.
- No. 12 Barber-Colman Hobbers
- No. 62 Fellows Gear Shapers
- No. 6 Fellows Gear Hobber
- 24" Gleason Gear Planer

MILLERS:

- No. 2A Brown & Sharpe, Universal
- No. 2AU Garvin Universal
- No. 2 Van Norman, Duplex
- No. 4 Hendey, Plain
- No. C Becker Vertical M.D.
- No. 5 Brown & Sharpe, Vertical
- No. 6 Becker Vertical
- 28" Cincinnati, Semi-Automatic
- 24" Cincinnati Duplex
- 18" Cincinnati, Duplex
- 60" Garvin Automatic Duplex
- No. 3 P. & J. Automatic Vertical

PLANERS:

- 72"x72"x12" Putnam, Hvy. Duty, Rev. M.D.
- 72" Morton Portable M.D.
- 60"x60"x12" Pond Rev. M.D.
- 48"x48"x16" Pond A.C. M.D.
- 42"x42"x13" Pond Heavy Duty. Rev. M.D. (2)
- 42"x42"x12" Cincinnati Rev. M.D. (2)
- 47"x40"x12" Gray M.D.
- 30"x30"x12" Whitcomb Heavy Duty M.D.

RADIAL DRILLS:

- 3½" American Plain, MD, thru G.B.
- 5" Cincinnati-Bickford, M. on Arm

MISCELLANEOUS:

- 24" Gould & Eberhart Shaper
- 16" Gould & Eberhart Shapers
- No. 3 B. & O. Turret Lathe
- 8" Stoeber Pipe Threader
- No. 2 Lapointe Dbl. Spindle Broach
- 500 ton NBP dbl. Carwheel Press
- 2" Gridley type "G" 4 Spin. Aut.

Performance and accuracy of our rebuilt machines unconditionally guaranteed.

NOTE:—We solicit rebuilding and motorization of your own machines.

ATLANTIC MACHINERY CORPORATION

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MILES QUALITY TOOLS

AUTOMATICS

1" Cleveland "J" dble. end
 1½" Cleveland "M" 4 spdl.
 1¼", 1¾", 2" Gridley 4 sp.
 3¼" & 4¼" Gridley 1 spdl.
 1½", 2" & 2¼" Nat. Acme ds.
 1" & 1½" New Britain 6 spdl.
 Nos. 24, 33 & 34 New Britain
 Gisholt Simplicatics

BROACHES

No. 2S Lapointe hydraulic
 No. 3 Oilgear hydraulic
 Nos. 1, 3 & 4 Lapointe
 No. 3 Lapointe double
 No. 3 American rack
 2 ton Amer. vertical

COMPRESSORS

868" Chicago Pneumatic
 708" Sullivan
 678" Ingersoll Rand
 620" Sullivan
 550" National
 355" Ingersoll Rand
 136" Chicago Pneumatic

DRILLS

3" Cint. Bk. radial
 3½" Morris radial
 3½", 4", & 6" Western radial
 6" N-B-P univ. radial
 Nos. 121, 217, 314, 315 Baker
 21", 24" & 28" Cincinnati
 Nos. 6D, 11D & 16D Moline
 10D Moline cylinder borer
 Nos. 17 & 25 Foote Burt
 No. 2 Colb., 1, 2, 3 & 4 spdl.
 All sizes and makes Sensitive

GEAR CUTTERS

Nos. 1 & 5A Lees Bradner
 26" & 48" B. & S. auto. spur
 36" G. & E. auto. spur
 Lipe 2 spindle Chamferer
 15" Gleason quencher

GRINDERS

Norton:—6"x32", 10"x36", 10"
 x50", 14"x50", & 14"x72"
 Landis:—10"x24", 10"x52",
 12"x52" & 12"x72"
 12"x40", No. 3 B. & S. univ.
 No. 2 Norton univ. T. & C.
 No. 1, 2 & 2½ Bath univ.
 18", 24", 30" & 53" Gardner
 disc

24", No. 84 Gardner disc
 8"x38" Manhattan surf.
 12"x36" Diamond surface
 16"x50" Safety surface
 24" Ingersoll tub
 84" Diamond face
 Pratt & Whitney thread
 Barber Colman hob

ENGINE LATHES

10"x5" Pratt & Whitney
 12"x6" Monarch
 13"x6" Willard
 14"x8" Lodge & Shipley

16"x6" Cincinnati
 16"x6" Hendey
 16"x10" LeBlond
 18"x18" LeBlond
 21"x18" LeBlond
 22"x10" Davis
 22"x12" Morris geared head
 23"x10" Rahn Larmon
 24"x10" LeBlond
 24"x10" Boye & Emmes
 24"x10" L. & S. geared head
 24"x12" Lodge & Shipley
 24"x16" Boye & Emmes
 26"x15" American geared hd.
 30"x12" Lodge & Shipley

TURRET LATHES

No. 1 Warner & Swasey
 No. 2 Sp. Garvin
 21" Gisholt
 24" Steidle
 Jones & Lamson 2 spindle
 No. 4 Bardons & Oliver

MILLS, BORING

40" Bullard
 3" Binsee horizontal
 5" Barrett cylinder Boring

MILLERS

No. 4 Cincinnati univ.
 Model C Becker rotary
 36", 72" Ingersoll rotary
 48" Ohio tilted offset
 28", 37" & 42" Briggs
 Nos. 1 & 1A Davis & Thomp.
 Type 45 Bilton Productomatic
 No. 2 Bilton gear
 Kent Owens (Toledo)
 2M Potter & Johnston

PRESSES

750 ton Baldwin Southwark
 triple act. hyd. toggle draw.
 142½" bet. uprs., 84" shut
 height, 550,000 lbs.
 600 ton No. 664B Toledo coing.
 40" between uprights
 150 ton No. 661 Tol. coin.3"str.
 100 ton French Oil Mchy. Co.,
 hyd. press for strng. casts.
 108" No. 796¼D Toledo Double
 Crank Toggle Drawing
 No. 1½ Bliss Toggle Drawing
 No. 164 (173) Tol. Tog. Draw.
 No. DDG54 Ferr. cam draw.
 48" No. 6A Bliss double crk.
 Tie rod frame, roll feed
 45" No. 151 Ferr. Dble. Crank
 28" No. 71 Swaine dble. crk.
 No. 21½ Bliss Consol. OBI
 No. 5-I Cleveland O.B.I.
 Waterb. F. OBI 4½" shaft
 No. 6 Bliss Consolidated O.B.I.
 No. 6 Toledo O.B.I.
 Nos. 75676 grd. Toledo gap
 Fremont gap, 75 tons
 Wat. Farrell gap, 40 tons
 No. P2 Ferracute

No. EG35 Erie punching
 No. 94 Bliss Consol. Punch.
 Nos. 55, 55½, and 56 Tol. str.
 No. 65 Consol., straight side
 No. 7 Rockford, straight side
 No. 8-7 ZEH & Hn., strt. side
 No. 74½ Bliss, straight side
 No. 4 Massillon, str. side, grd.

SHAPERS

16" & 24" Gould & Eberhardt
 16", 20" & 24" Walcott
 16" Kelly
 20" Smith & Mills
 24" Milwaukee
 24" Columbia
 24" Cincinnati shaper planer
 28" Ohio
 36" Morton draw cut

THREADERS

1½", 1", 1½", 2" Landis doub.
 1½", 1½", 2", 2½" Landis sgl.
 1½" Acme double
 1½" Geometric
 3" Acme

UPSETTERS

1½" No. 3 Manville SSSD
 1½" Acme stop motion
 1½" Ajax cont. motion
 2½" Ajax suspended slide
 4" Ajax suspended slide
 4" Ajax original motion
 No. 1A Ajax forging rolls

MISCELLANEOUS

Bulldozers, Nos. 25 & 9 W.&W.
 Borer, Diamond, No. 45 Heald
 Borer, Diamond, Coulter vert.
 Borer, Diamond, Barnes
 Blue Printer, No. 20 Wickes
 Brake, 10"x3/16, No. 205Chgo.
 Balancer, 44" Norton
 Centerer, Hanson Whitney
 Centerer, 4"x38" Sundstrand
 Hammer, 400 & 600 lb.
 Chamb. board
 Hammer, 3B Nazel air
 Honer, 5 H.P. Hutto mod., md.
 Hoist, ½, 1 & 3 ton electric
 Keyseater, No. 2 Mitts & Merr.
 Lapper, Type 15 Norton
 Plater, 3000 amp. 15 v., Jantz
 & Leitz
 Punch, 26", 3¼"x3¼" Clevel.
 Punch, 12", 1¼"x1" Long &
 Allstatter
 Riveter, 1½B, 2A, 3A, 4A, 5A,
 7B, high speed
 Riveter, 20T, Allen: 30THanna
 Saws, 6", 8", 12"Racine hack
 Saws, 6", 7", 12" Cold Saws
 Washer, Blakeeale continuous
 Welders, butt. 25, 35, 65, 75
 & 110 KVA.
 Welders, spot, 12 to 150 KVA.

PARTIAL LIST ONLY. SEND US YOUR INQUIRIES.

MILES MACHINERY CO.
 Saginaw, Mich.

EMCO REBUILT

MILLING MACHINES

No. 5G LeBlond Universal, m.d.
No. 35 Oesterlein Universal, cone
No. 2 Cincinnati Universal, cone
No. 22 Garvin Vertical, belt
No. 3H LeBlond Plain, cone
No. 13B B. & S. Plain, taper spindle
No. 13B Brown & Sharpe, Pl., screw nose
No. 15 Garvin Plain, cone
No. 25 Becker Plain, cone
Gooley & Edlund Briggs Type
C66A Newton 3 spindle Continuous, s.p.d.
24" Cincinnati Plain Automatic, belt
48" Oesterlein Tilted Offset, m.d.

GRINDERS

12x72" Cincinnati Self-Contained Universal, 3 motor drive
12x18" Cinc. Self-Contained Plain, 2 m.d.
3" Woerner, m.d.
No. 1 Landis Universal, belt
6x18" Landis Plain, m.d.
6x32" Norton Plain, m.d.
No. 14-10x18" Brown & Sharpe Pl., belt
No. 14-10x48" Brown & Sharpe Pl., belt
10x36" Norton Plain, belt
10x36" Norton Plain, m.d.
10x50" Norton Plain, m.d.
10x50" Norton Plain, belt
10x72" Landis Plain, m.d.
12x18" Cincinnati Plunge Cut, 2 m.d.
12x36" Cincinnati Plain, belt
12x36" Modern Plain, m.d.
12x48" Modern Plain, m.d.
16x48" Cincinnati Plain, belt
No. 50, 55, 60, 65 Heald Cylinder
No. 3 Brown & Sharpe Planer Type Sur.
18x48" Diamond Light Duty Face
30x84" Diamond Heavy Duty Face
Springfield Planer Type Surface
Covell-Hanchett Knife, 102" cap, m.d.
No. 1 Cincinnati Universal Tool & Cutter
No. 1 LeBlond Uni. Tool & Cutter, 2 m.d.
No. 2 Norton Universal Tool, belt
No. 4, 5, 4l Oliver M. D. Drill Pointers
No. 23 B. & S. Gear Cutter Grinder, belt
Gleason Cutter Grinder, belt
Sellers Drill Grinder, m.d.
No. 1, 4, 6 Gardner Disc, m.d.
No. 51 Bealy, m.d.
No. 120 Gardner, belt
No. 70 Heald Internal, belt

GEARED HEAD ENGINE LATHES

60"x30½" Niles, s.p.d.
60"x27½" Niles, m.d., with m.d. carriage
60"x26½" Niles, m.d.
36"x22" LeBlond, m.d.
27"x18" LeBlond, m.d., taper
27"x18" Axelson, m.d., taper
26"x16" Bradford, m.d., taper
25"x18" LeBlond, m.d., taper
20"x8" American, m.d., taper
24"x18" Lodge & Shipley, m.d., taper
20"x14" Hendey, m.d., taper
20"x10" American, m.d., taper
20"x8" Greaves-Klusman, m.d., taper
18"x15" Lehmann, m.d., taper
18"x12" American, m.d., taper
16"x8" American, m.d., taper

PLANERS

72"x48"x12" Dietrich & Harvey Openside,
3 heads, reversing m.d. box table
60"x60"x12" Niles, belt, 3 hds., box table
60"x48"x16" Niles, 3 heads, m.d.
54"x42"x12" Gray, reversing m.d., 4 hds.
36"x36"x10" Whitcomb-Blaisdell, belt, 2hds.
36"x36"x10" Cincinnati, belt, 3 heads
34"x24"x8" Cincinnati, belt, 1 head
32"x32"x8" Gray, 1 head
30"x30"x10" Cincinnati, belt, 2 heads
30"x30"x10" American, belt, 1 head
30"x30"x8" Pond, belt, 1 head
30"x30"x8" Gray, belt, 2 heads
30"x30"x8" Gray, belt, 1 head
24" Cincinnati Crank, belt, 1 head

SHAPERS

16" Cincinnati, belt
16" Davis, gear box
20" Hendey, cone
20" Queen City, cone
20" Smith & Mills, cone
24" Barker, cone
24" Cincinnati, cone
24" Rockford, cone
28" Ohio, cone
24" Gould & Eberhardt, cone
28" Gould & Eberhardt, cone
32" Gould & Eberhardt, gear box

TURNET LATHES

No. 3 Cinc. Acme Univ., m.d., bar equip.
No. 2A, 3A W. & S. Uni. chuck, equip., m.d.
No. 2 Pratt & Whitney, cone
No. 2 Warner & Swasey, cone
No. 3 Foster, cone
No. 4 Woods, cone
1" Biggs, cone
2x24" Jones & Lamson, m.d., bar
2x26" Pratt & Whitney, cone
2½x26" Modern, cone
2 spindle Jones & Lamson, Steel Hd., m.d.
2 spindle 3x36" Jones & Lamson
3x36" Jones & Lamson
16" Warner & Swasey, cone
18" Libby Type A, m.d.
20" Cincinnati Acme, cone
21" 24" Gisholt, cone
24" Gisholt, m.d., var. speed

ROLLS

10" Niles, 1" cap, belt
24" Niles, 1-¼" cap, pyramid, str. bk. type

PRESSES

No. 496D Toledo Dble. Crank Toggle Draw, m.d., 8" between housings, stroke of blankholder 11½", weight 160,000 lbs.
No. 268½" Toledo D.C. Toggle Drawing, m.d., 84" between housings, 15" stroke, weight 175,000 lbs.
No. 94 Bliss Consolidated
No. 92B Toledo D.C. geared
No. 93A Toledo D.C. geared
No. 54A Toledo Special
DG53 Ferracute Redrawing
SS1 Ferracute D.C.
No. 50-4-36 Minster S.S.
No. 16 Bliss Harning
No. 6 Waterbury-Farrel D.C.
No. 5 Bliss Stiles Type
DD2 Ferracute Double Action Drawing

PARTIAL LISTING ONLY.

THE EASTERN

1001 TENNESSEE AVENUE,

MACHINE TOOLS

P2 Ferracute Stiles Type
 P2 Ferracute Drawing
 C2 Ferracute O.B.I.
 No. 2S Consolidated O.B.I.
 No. 1½ Bliss Cam
 Waterbury-Farrel S.A. Open Back
 Swaine Horning
 300 ton Niles Wheel Press

WELDERS

12" Winfield, 20 KVA
 25 KW Federal, 30" throat
 40 KVA Thompson-Gibb, 21" throat
 100 amp. Winfield, 18" throat, 47 KVA
 200 amp. Lincoln Stable Arc
 300 amp. General Electric Arc

AUTOMATICS

¾-1½ Cleveland Model B
 ¾ Cleveland Model A
 1¼ Cleveland Model A
 1½-1½ Cleveland Model A
 2 Cleveland Model A
 4 spindle Gridley Model F, m.d.
 No. 5A, 6A Potter & Johnston Automatics
 No. 6D Potter & Johnston, m.d.

RADIAL DRILLS

2½ Cincinnati Bickford, gear box
 2½ Avey Sensitive
 2½ Fosdick, gear box
 3 American Sensitive
 3 Carlton Sensitive
 4 Dreeses, gear box
 4 Ryerson Plain, gear box
 4 Hammond Jack Knife
 4 Niles-Bement-Pond Semi-Universal
 5 American Triple Geared, gear box
 5 Bickford Plain, d.c. drive
 5 Cincinnati Bickford, gear box
 5 Dreeses Plain, gear box
 5 Niles-Bement-Pond Semi-Universal, m.d.
 5 Prentice Plain, cone
 6 Niles-Bement-Pond Full Uni., gear box
 6 Fosdick Plain, gear box
 7 Dreeses Plain, gear box
 7 Fosdick Plain, cone

BORING MILLS

30" Gisholt, cone
 42" Gisholt, gear box
 51" Baush, m.d., 2 heads
 6 Colburn, m.d., 2 heads, p.r.t.
 6 Gisholt, m.d., 2 heads, p.r.t.
 7-10" Niles, m.d., 2 heads
 7" Niles, cone
 10" Niles, cone
 5¼" bar Niles Horizontal, m.d.
 5" bar Barrett Horizontal, m.d.
 Niles-Bement-P Cyl. Borer, 12" main bar

CONE HEAD ENGINE LATHES

15"x8" Sidney, taper
 16"x6" Rockford
 16"x8" Cincinnati
 16"x8" Rockford
 18"x6" Schumacher-Boye
 18"x8" American
 18"x8" Cincinnati
 18"x8" Hendey
 18"x8" LeBlond

18"x8" Mueller, taper
 18"x8" Springfield
 18"x10" Schumacher-Boye, taper
 18"x14" LeBlond
 19"x8" LeBlond
 19"x12" LeBlond, taper
 20"x10" Davis
 20"x10" Lodge & Shipley
 21"x8" LeBlond, taper
 21"x10" LeBlond, taper
 21"x16" LeBlond, taper
 24"x10" Bridgeford
 24"x10" Canada
 24"x10" LeBlond
 24"x11" Chard
 24"x12" American
 24-48"x16" McCabe 2 in 1
 24"x16" Schumacher-Boye
 26"x18" Schumacher-Boye, taper
 27"x16" Bridgeford
 36"x10" Schumacher-Boye
 42"x24" Springfield loose change

GEAR MACHINERY

6" 11", 18" Gleason Straight Tooth Bevel
 16" Cincinnati Hobber
 No. 1 Lees-Bradner Hobber
 No. 3-26 and 3-36" Brown & Sharpe
 No. 3H Brown & Sharpe
 No. 4-36" Brown & Sharpe
 36" Gould & Eberhardt Gear Cutter
 No. 5A Lees-Bradner
 No. 6-60" and 6-72" Brown & Sharpe
 No. 12 Barber-Colman Gear Hobbers
 No. 615 Fellows Gear Shaper
 Gleason Spiral Rougher
 Gleason Gear Tester
 Peerless Gear Tooth Rounder
 Rochester Gear Tooth Rounder
 Schuchardt & Schutte Gear Tooth Rounder

MULTIPLE SPINDLE DRILLS

5 spindle 24" Barnes All Geared Self-Oil.
 6 spindle 21" Hoefer Gang
 6 spindle National Acme Horizontal
 6 spindle Niles
 No. 00S, 1SS Garvin Horizontal
 D2 Fox Straight Line
 No. 2, 3 Naush Multiple rect. head
 No. 7D Moline 2 spindle Hole Hog
 No. 14 Natco Multiple
 No. 15HC Fox, m.d.
 No. 18 Natco
 No. 25 Baush
 No. 26C Fox Tapper
 No. 30 Natco
 No. 51C Harrington
 No. 220 Baker

MFG. LATHES

No. 5 Niles-B.P. Car Wheel Lathe, new
 No. 6 LeBlond Multi-Cut
 No. 12 LeBlond Automatic, m.d.
 Niles-Bement-Pond Quartering Mach., new
 3½x36" LoSwing
 3½x60" LoSwing
 6" Sundstrand Stub
 15"x6" Automatic Threading
 18"x8" Chard Production

SEND US YOUR INQUIRIES.

MACHINERY CO.,

CINCINNATI, OHIO

NOTICE: EXCEPTIONAL TOOLS

No. 3-A W.6S., 4½" bar cap., a.c. & b.f., collets, m.d., ser. 432,000, latest model, Timken Bearing
No. 2-A W.6S., chuck work, tools, m.d., ser. 492,000, factory rebuilt, excellent condition
53"x22" LeBlond Lathe, trip. geared, q.c.g., b.d., excellent condition
20"x12" Hendey Lathe, q.c.g., t.a., belted motor drive
14"x8" Davis q.c.g. Lathe, thread dial, chucks

14"x8" Putnam l.c.g. Lathe, t.a., 3-jaw chuck
No. 3 Adams Gear Hobber, factory rebuilt 1" cap. Hand Screw Machine, friction back geared head, collets, c.s.
Oliver Arc Face Mill Grinder, 24" cap.
No. 4½ R. & K. Punch Press
Avey sgl. spdl. Tool Room Drill, b.d.
Avey 3-spd. Drill, b.d.
Allen 6-spd. Drill, b.d.
20" Barnes 4-spd., a.g.h., p.f. Drill
4' Fosdick Radial Drill, gear box drive

MOSER MACHINE TOOL SALES

— 1608 W. Clybourn St., Milwaukee, Wis.

LIKE MAGIC FROM STOCK

SHAPERS

24" G&E motor drive
28" G&E Invincible; cone
26" Smith & Mills, cone
24" G&E S. Hi. Duty, cone
24" Kelly, cone
24" G&E S.P.D. Hi Duty
24" Cincinnati, cone
20" Mattison, cone
20" Cincinnati
20" Kelly
16" G&E Hi Duty, cone (2)
16" Smith & Mills
16" Steptoe, cone (2)
16" Stockbridge

KEYSEATERS

No. 3 Baker, 72" capacity
No. 1 Davis (2)

MILLERS

No. 0 Van Norman (2)
No. 1 Van Norman (4)
No. 1 Van Norman
No. 2 Van Norman
No. 3 Cincinnati, Universal
No. 2 Kempanith, Universal
No. 4 Cincinnati, Universal;
Gooseneck overarm, bar feed
No. 14 Rockford, Plain
No. 13-B Brown & Sharpe, Production
No. 11 Brown & Sharpe, plain
No. 12 Brown & Sharpe, Production
No. 1 Kempanith
No. 00 Brown & Sharpe; hand
No. 6 Whitney, hand
No. 4 Burke, Bench, Pwr. fd.
No. 3 Burke, Bench
No. 5 Stark, Precision Bench, Hand; 3" collet (4)
No. 4 Stark, Precision, Univ., bench; 1" collet
No. 2 Pratt & Whitney Spline Miller
No. 6 Jackson Die Sinker or Vertical Miller; Q.C.G. Box; arranged motor drive.
BORING MILLERS
Colburn 54" Boring & Turning Mill; M.D.
Bullard "New Era" 36" Vertical Turret Lathe
Bullard "New Era" 24" Vertical Turret Lathe
THREAD MILLER
4½"x12" Pratt & Whitney

SHEARS

10"x12" Waise & Ross Plstg Sh.
6"x12" Niagara No. 6E
4x3/16 Niagara No. 748
42"x16 ga. Stoll No. 142
36"x16 ga. Stoll No. 136
36"x14 ga. Stoll No. 236
No. 1 Buffalo Universal Ironworker
No. 0 Buffalo Bar Shear
No. 1 Pels Universal Ironworker, Hand
No. 208 Niagara Circle Shear & Flanger

ENGRAVER

No. 3 Zeiss, arranged for flat and roll work

DRLS

Baker, No. 121, Motor Drive
Colburn No. 2, Motor Drive
Barnes 5-spindle Hole Hg
No. 5
Avey No. 3 "Aveymatic" 2-spindle
Avey No. 3 with Tapping Head on Spindle
Avey No. 3, 24" table, 12" overhang
No. 12 Netro Multiple Spindle, also No. 11
Hundreds of single, two three and four spindle Drills in Stock

RADIAL DRILLS

0' Niles-Bement-Pond
4' Bickford; 4' N.H.P. Semi-Universal
4' Dreses
3½' Silver
3' Dreses; 3' Bickford
3' Dreses Simplex
2½' Carlton, Sensitive
2½' Fosdick

GRINDERS

Norton 14x50 Plain
Cincinnati 12x36 Plain, motor-lad
Brown & Sharpe No. 10 Plain
Fitchburg 8x20 Plain; hand feed
Brown & Sharpe No. 14, 10"x48" between centers
Landis No. 3 Universal 12x36
Cincinnati No. 3 Universal

Rivett No. 103 Universal
Wilmarth & Mormon No. 3 Surface Grinder
Diamond No. 1 Hand Surface Grinder
Diamond 12 x 12 x 24 Surface Grinder; M.D.
Brown & Sharpe No. 2, 6x18 Surface Grinder
Pratt & Whitney 12x36 Surface Grinder; Vert.
Gardner No. 7 Disc & Ring Wheel 40" B.B.
Gardner No. 4 Disc Grinder; 26" discs; Univ. Table
Badger 12" disc Grinder Dbie. End; B.B. Univ. Table

GRINDERS, INTERNAL

Churchill (Worcester) Internal Grinder
Brown & Sharpe No. 22
Rivett No. 6
Brant No. 15A Internal and Face Grinder

GRINDERS, ROTARY

Head 20"—12"
Persons-Arter 8"
Head Ring, 7½"

GRINDERS—TOOL & CUTTER

No. 1 LeBlond with power feed, like new
No. 14 Cincinnati
No. 1 Greenfield like new (2)
No. 2 Walker
No. 2 Norton, complete
Also Double End Floor Grinders—All Sizes

TURRET LATHES & SCREW MACHINES

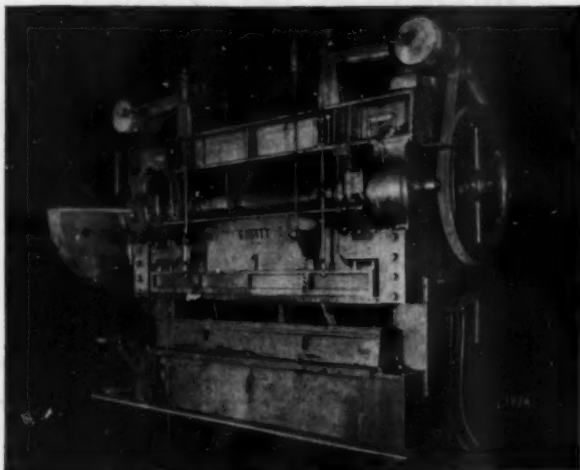
Warner & Swasey No. 2, G.F. H. Hollow Hex. Turret
Warner & Swasey No. 1, G.F. H. Hollow Hex. Turret
Foster No. 7 G.F.H.; P.F.T.; cross slide
Foster No. 1; 8" capacity
Foster No. 2 Geared Friction Head; P.F.T.
Warner & Swasey No. 2 Geared Friction Head; Wire fd. (3)
Warner & Swasey No. 2 Plain Friction Head

FAULK MILL SUPPLY CO., Inc., 18 Ward St., Rochester, N. Y.

95% NEW MULTIPLE PUNCH

Steel Frame Beatty No. 30-B

Available for Immediate Shipment



Vertical Clamping
Stripper Attachment to
Ram. Single Station
Force Feed
Lubrication System

Capacity 240 tons
Dist. bet. housing... 9' 6"
Stroke 4"
Vert. Adj. to Ram... 3/4"

Can Be Inspected At
Our Plant
At
HAMMOND, INDIANA

OTHER MACHINES IN OUR SHOP FOR IMMEDIATE SALE

Gould & Eberhardt 40" x 9" Automatic Gear Cutter with pump and standard equipment
Newark 48" x 12" Gear Cutter with 7-1/2 H.P., G.E. motor
Williams & White H. D. Multiple Punch, 50" between housings, 3" stroke, 17" die space stroke down, single main gear drive
Cleveland "EF" S.E. Punch, capacity 1-1/4" thru 1", plain table, 48" throat depth, m.d.
Rock River S. E. Punch, capacity 1" thru 1", 36" throat, architectural table, equipped with a set of angle shears, motor drive
22" x 10' I. H. Johnson Lathe, quick change gears, single back geared, belt driven
22" x 10' I. H. Johnson Lathe, quick change gears, single back geared, belt driven, taper attachment
Baker No. 310 H. D. Drill, capacity 2-1/2" solid steel, No. 5 Morse taper in spindle, single pulley drive
Pedrick No. 2 Floor Type Boring Mill, 6" bar, 36" head, motor drive
Ingersoll Fixed Rail Planer Type Milling Machine, table 24" x 14', motor drive, 2 horizontal and 2 vertical spindles
50-Ton Hanna Pit Stationary Riveter, compression yoke type, 140" reach, 18" x 24" gap
Two Allen Riveters, 50 ton capacity, 12" gap, 10" reach
Two Allen Riveters, 50 ton capacity, 8" gap, 10" reach
Allen Riveter, 30 ton capacity, 15" gap, 34" reach
Two Hanna Riveter, 50 ton capacity, 8-1/4" gap, 8" reach
Hanna Riveter, 50 ton capacity, 24" gap, 20" reach, shepard type
Hanna Riveter, 80 ton capacity, 18" gap, 20" reach

BEATTY MACHINE & MANUFACTURING CO.
HAMMOND, INDIANA

HIGH GRADE MACHINE TOOLS

ENGINE LATHES

TURRET LATHES

MILLERS

GRINDERS

RADIAL DRILLS

GEAR CUTTERS

GEAR HOBBERS

GEAR GENERATORS

PLANERS

Other types of machine tools.

Indianapolis Machinery & Supply Co., Inc.
1959 SOUTH MERIDIAN STREET, INDIANAPOLIS, INDIANA

No. 1 Diamond Grinder 12" x 24" Cap. Mag. Chuck, B. Dr.
2½" to 8" Merrell Pipe Machine A. C. Mtr. Dr.
18" x 8' Whitcomb-Blaisdell Grd. Hd. Lathe, 8-speed changes.
12" x 36" Webster & Perks Pl. Cyl. Grinder, B. Dr.
5 x 30" Thompson Univ. Cyl.—Surface—T & C Grinder, B. Dr.
30" x 10' D. & H. Openside Planer 1-Hd.
3-24"x6' G. A. Gray & Ohio Planers, 1-Hd.
24" x 12' Chandler Planer, 2-Hds.
32" x 10' Niles Planer 2-Hds.
32" x 8' Gleason Planer, 2-Hds.
2½" Landis Bolt Cutter with Lead Screw
3½" Acme with Landis Hd.
8' x 10 ga. D. & K. All Steel Pan & Box Type Brake.
150-Ton 48" Caldwell Hyd. Wheel Press
400-Ton 48" Niles-Bement-Pond Hyd. Wheel Press
175-A Consolidated Inc. A. C. Mtr. Dr. Dbl. Crank Press
42" Between Uprights with gap, 71-tons
6' Bickford Univ. Radial Drill, Pl. Base.
24" x 12" New Haven Lathe, 3-step cone dbl. bk. grs. Hvy. Type, Rebuilt
25" Smith & Mills Bk. Grd. Crank Shaper, Cone Dr. Helical Bull Gear
80 lb. and 200 lb. Bradley Hammers.
36" and 48" B. & S. Spur Gear Cutters
30" Diamond Mtr. Dr. Face Grinder, Table 23" x 86"

THE NORTON-BROADWAY MACHINERY CO.

610 Baymiller Street,

Cherry 5208

CINCINNATI, OHIO

VICTOR'S BARGAINS IN Tungsten Carbide Tipped Tools

Price \$1.00 Each In Any Size

New Low Prices. — Increase Production — Cut Operating Costs

Tools are tipped with Tungsten Carbide, and are suitable for machining cast-iron, brass, bronze, aluminum, non-ferrous materials (such as hard rubber, bakelite, fibre), and tough alloy steels up to 500 Brinell hardness.

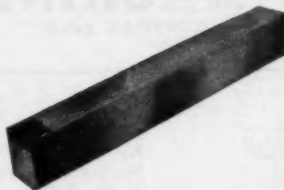


Left-100 Series

Left Hand-Reverse Image, Right Hand Shown		
Tool No. RH	LH	Shank Size
R-100	L-100	1/4x1/4x2
R-101	L-102	5/16x5/16x2 1/4
R-103	L-104	3/8x3/8x2 1/2
R-105	L-106	7/16x7/16x3
R-107	L-108	1/2x1/2x3 1/2

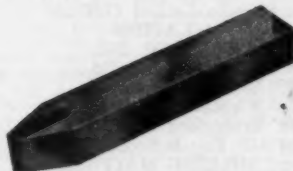
Right-200 Series

Tool No.	Shank Size
200	1/4x1/4x2
201	5/16x5/16x2 1/4
202	3/8x3/8x2 1/2
203	7/16x7/16x3
204	1/2x1/2x3 1/2



Below-300 Series

Tool No.	Shank Size
300	1/4x1/4x2
301	5/16x5/16x2 1/4
302	3/8x3/8x2 1/2
303	1/2x1/2x3 1/2



STANDARD TUNGSTEN CARBIDE TIPPED TOOL BITS

In lots of 12 assorted in any Series; 100-200-300 Series an extra 10% will be allowed; also in lot of 50 assorted 20% discount will be allowed.

Sizes not listed as well as special TIPPED TOOLS will be quoted upon request. When ordering, state tool number and quantity desired.

We Carry Silicon Carbide Emery Wheels for Grinding Tungsten Carbide Tool Bits

SEND FOR OUR NEW 1941 GENERAL CATALOGUE.

Victor Machinery Exchange, Inc.

251 CENTRE STREET

NEW YORK, N. Y.

PUNCHES

No. 6 Whiting\$375
No. 8 Whiting 475

PLANERS

12"x42"x42" Bedford Open-
Side Stone PL.—M. D. 750
36" Cleveland Rotary—M. D. 600

GRINDERS

No. 1 Gardner Disc—B.B. 100
No. 4 Gardner Disc—B.B. 225
No. 6 Gardner Disc—2 Univ.
Tables Chk. Grd. At 275
LaSalle Hand Surf. Grdr. 50
6" Heald Rotary—With
Magnetic Chuck 125

PUNCH PRESSES

No. 156 Niagara Reducing—
8" Strk. Cl. T., Bk. Crd. 750
No. 84S Bliss M.D. 34" St. 375
Bliss Rack and Pinion Press 375

MISCELLANEOUS

No. 2 Hl. Speed Hammer 85
Power Driven Screw Press 75
1/2" Cap. Drill Press
Motor Drive, New 60
No. 8 Kick Press 45
2" Oster Pipe Machine .. 75

LATHES

26"x16" Prent. Grd. Hd.-S.P.D.
18"x13" Lehmann Q.C.G.-Mzd.
18"x10" LeBlond Q.C.G.-C. Dr.
16"x6" L&S.-C. D. Bold Type
16"x6" Chard Q.C.G. Mtz.-TA.
16"x6" Bradford Q.C.G.-C. Dr.
14"x6" Rockf. Q.C.G.-C.-Dr.-TA.
16"x8"; 16"x8"; 20"x10" Loose
Change Gear
9" Sundstrand Mfg.—Grd. Hd.

RADIAL DRILLS

4', 5' and 6' Carleton Fully
Enclosed Hd. S.P.D. Through
Gear Box-Tap. Attachments

SCREW MCHS.-TUR. LATHES

No. 2 Foster Frc. Hd.-Bar Fd.
Acme Friction Hd.-1 1/2" Ca-
pacity. Fully Equipped
Nos. 0 and 1 B. & S. Hand
No. 1 Bardons & Oliver-Collets
24" Milwaukee Turret Lathes
—4 1/2" Hole Spindle

MILLING MACHINES

No. 24 Oesterlein Pl.-Cone Dr.
No. 1 B. & S.—Universal-M.D.
No. 11 1/2 B. & S. Univ.-M.D.
No. 5 Burke Hand Mill—Arb.
No. 2 Whitney Hand Mill—Arb.

SHAPERS

23" Rockford Bk. Grd.-Cone D.
24" G. & E. Bk. Grd.-Cone Dr.
24" Amer. Bk. Grd.-Cone Dr.
20" Rockford-Sgle. Pulley Dr.
20" Steptoe Bk. Grd.-Cone Dr.
16" S. & M. Helical Bull&Pin.

DRILL PRESSES

1 to 6 Spindle-Allen, L.G.A.—
Belt and Motor Drive
26" Barnes Sliding Head—
Back Geared Power Feed
No. 2 Avey Sgl. Spdl. M. D.
17" Caneby OttoSlidg. Hd.-MD.

GRINDERS

No. 2 Brown & Sh. Surf.-M.D.
No. 3 B&S. Cutter & Reamer
No. 1 Nort. Tool & Cut. Grdr.
No. 1 Wil. & M. Surf.—Hand

PUNCH PRESSES

No. 93C Tol. S.S. Dbl.Gr.Bk.G.
No. 91B Tol. Dbl. Crank-3" St.
No. 37 1/2 Bliss Strt. Side-Bk.Gr.
No. 83 Consol. Horning Press
No. 5 Ames Can—Back Grd.
No. 2 Walsh O.B.L.-1 3/4" Strk.

CLINTON MACHINERY CO.

35 S. CLINTON ST.

CENTRAL 3619

CHICAGO, ILL.

DRILLS

3 1/2' Western Radial
4 Spindle No. 17 Foot Burt
2-3-4 Spindle Leland Giffords

LATHES

14"x6" American Gd. Hd.
16"x8" Springfield Gd. Hd.
18"x10" Mueller, Taper att.
20"x10" Whitcomb, Gd. Hd.
36"x14" Bridgeford Gd. Hd.
32"-64"x11" Fay & Scott Sliding Bed G.

MILLING MACHINES

No. 4 Cincinnati
No. 5 Cincinnati
18" Cincinnati Mfg.
2" Pratt & Whitney Double Spline

GRINDERS

14"x36" Norton Hydraulic Multipurpose
Universal
20"x36" Landis Universal

BORING MILLS

72" Bickford Vertical, 2 Hds.
72" Bullard, 2 Hds.

86" Bullard Vertical, 2 Hds.

PRESSES

178 Toledo, Toggle M.D.
No. 4N Bliss M.D.
No. 1 1/2 Bliss Cam Action
3—No. 2 Waterbury Farrell
8—No. 31 Waterbury Farrell

TURRET LATHES

5A Potter & Johnston
24" Steinle, 6 1/4" hole
26" Libby
2 Spindle J & L Steel Head
1 1/2" Pratt & Whitney Bar Feed
2 1/4"x24 Jones & Lamson

MISCELLANEOUS

No. 13 Brown & Sharpe Gear Cutter
No. 4-48" Brown & Sharpe Gear Cutter
36B Gould & Eberhardt Gear Cutter
9"x9" Peerless Shaping Saw
No. 12 Pratt & Whitney Profiler
26"x26"x8" Woodward & Powell Planer
6" Campbell Nibbler
8" Standard Pipe Threader

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Good Used Machinery

ARC WELDER—G. E. 200 amp., m.d.

BORING MILLS—Baush 44" m.d. Bullard 51" Vert. 2 hds.; Bullard 42" Mill, vert.; Rockf. No. 2 horiz.; 3 1/4" Bar; Colburn 42" Vert. 2 Hds.

BRAKES—D. & K. 5' Box & Pan, 14 ga. Keene 10' 16 ga. Toggle Press.

DRILLS (RADIAL)—Mueller 2 1/2", Fosdick 2 1/2", Fosdick 4", Carlton 4" all gear box dr.; Hammond 4" sensitive; Mueller 4 1/2" g. box; Bickford 4" Gr. Box.

DRILLS (H. S. B. B.)—H & W 2, 4, 5sp.; Allen 2 & 6-sp.; Avey, Demco, Lal-Giff. 1-sp.; Sipp 2 & 3-S.P.; Avey 2-sp.; Avey-matic 2-sp., m.d.

DRILLS (MISC.)—Baker No. 217 (2) Hvy. Duty; Hamilton 42" S. H.; Barnes 20" & 24" 1-sp. & 20" 4-sp. & 24" 3-sp. all grd. camel back; P & W No. 12 Multi-Sp.; Natco 20 sp. Rect. head; P. & W. 24 sp. Adj.

GEAR CUTTERS—G & E 60" & B & S 26" s. p. d. automatic spur; Cincinnati 36" gear cutter. G. & E. 48" gear Cutter.

GRINDERS—P & W 12" vert. surf.; Cin. No. 1 1/2 & B & S No. 12 univ. tool, B & S Nos. 11616 pl. Head Nos. 60665 Int.; Landis 10x30" Plain; B & S 10x48"; 3-Norton 6x32" plain, Head No. 20 Rotary Surface (3); Badger No. 220, auto. d. e., opposed disc (4); Norton 10" x 36"; Diamond No. 2 Auto. Surf.

HAMMERS—Mayer 50-lb.; W & W 165 lb.; Beaudry 400 lb.; Beaudry 150 lb.

KEYSEATERS—Mitts & Merrill No. 5 vert. Davis No. 1; M. & M. No. 0.

LATHES—Monarch 16"x10" M.D.; LeBlond 18x8"; Lehmann 18"x8"; Amer. 22x8"; Davis 22"x10"; L & S 20"x10"; S-B & E 20"x10" q. c. g.; Fiather 22"x10"; LeBlond 16"x8"; Gleason 45"x12"; Monarch 16" x 8" (2); Ryerson 20x10", m.d.; Mueller 22"x12", S.B.E. 30"x12" Q.C.G. Hendey 16"x8" C.H.; Hendey 16"x10" grd. hd.

MILLING MACHINES—Cin. No. 1 1/2, Ohio No. 29, 3 & Brown & Sharpe No. 3 Universal; Ohio No. 20, American No. 1 1/2,

Cin. No. 3, Hendey No. 3, B & S No. 3, LeBlond No. 3H, LeBlond No. 4 M.D. C.D. & Cleveland No. 2 S.P.D. Plain Cin. 24" Auto. Plain; Becker No. 6 and Model "B" Vertical; Owen Duplex; Ingersoll M.D. Slab Miller 4 hds.; Becker No. 5-B Vertical.

THREAD MILLERS—Lees-Bradner No. 3 Collet Type; Smalley General No. 23-A; Moline No. 10

PLANERS—Gray 48" x 48" x 10"; Gray 28"x28"x6" 1-hd.; Pond 32"x34"x10"; Sellers 36x36x12"; Pease 26"x26x9".

PROFILER—Becker No. 2-H

PUNCH PRESSES—Federal Nos. 1, 2, 3 o.b.i.; Bliss No. 18 & 19; Ferracute No. P-4; Fer. No. EGF 52 Coining; Willard No. 4A o.b.i.; Swaine No. 38 arch, Swaine No. 37 O.B.I.; Rockford Nos. 2 & 3; and Verson No. 4 O.B.I.; Bliss No. 19 1/2; Michigan No. 4 O.B.I.; Niag. No. 4, Niag. No. 5, L & J No. 3, Bliss No. 407-A Double Action Toggle Drawing wt. 70000 lbs.; Bliss No. 68-N; Cons. No. 24 Blanking; Bliss No. 20;

SAWS (HACK)—Rac. 6x6" h.s.; Rac. 6x8; Peerless 6x6" H.S. (4); Atkins 8x8".

SAWS (COLD)—Cochrane & Bly Nos. 2-B & 4-B; Peerless 6x6 Univ. Shaping.

SHAPERS—S & M, G & E, Ohio, Mil. Q. City, Davis, Cin. 16"; Ohio 6 G & E 20"; S & M, Q. City, Rock, Cin. 24"; Ohio 26"; Cin. 24" s. p. gr. box; American 24" heavy, b.g. Amer. 15"; Springf. 15"; S.&M. 26", b.g. G. & E. 24", s.p., gearbox; Amer. 20"; Rhodes 7"

SCREW MACHINES—8 Hand; Nat. Acme. Nos. 515, 4-sp.; Gridley 4-sp. 3/4"; Automatic, Gridley 4 spindle, 2 1/4"; B.&S. No. 4 Hand; Nat. Acme No. 52; Gridley 4-sp. 9/16"

SLOTTER—Bement-Miles 10" vert.

SQUARE SHEARS—Ohl 10" 10 ga.; Bertsch 60" 16-ga. gap; Niag. 10' 14 ga.

TAPPING MACHINES—(2) Garvin No. 2 & 2X Vertical Automatic & Garvin No. 1.

TURRET LATHES—Baush 30" M.D.; Bullard 24" vert. rap. prod.; W&S. No. 8; Potter & Johnston, 8 1/2x16 No. 10

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30 ft. and 20 ft. ALLIANCE BENDING ROLLS



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6 Model B 4-Spindle Acme, 3" Capacity

Cleveland, 2", 1 1/2", 2" & 3 1/2" Model B; 4 1/2" Gridley; 6 Spindle New Britain—1 1/2" cap.; No. 00 B. & S.; No 1, 2, 3 Manville

BORING MILLS—VERT.
72", 24" & 36" Bullard; 30" and 72" Colburn rapid traverse vert.; 50" Bullard, 2 hds.; 52" Niles, 2 hds.

BORING MILLS—HORIZ.

No. 300 G. & L. 4 1/2" bar; Beaman & Smith, 3 1/2" dia.sp. 12" Niles Cyl. Dble. End 7" Bar Putnam-table type; 3" Beaman & Smith; 3 Beament

BRAKES, CHGO. STEEL

Hand—3'16, 4'12, 4'16, 6'16, 8'18, 8'16, 8'14, 10'14, 10'16, 10'18
Box & Fan—4', 5' 14 ga. 4' & 6' 10 ga., 10'16ga.
Power Apron Type—10' 3" 12' 4" 12' 3/16"—10' 10 ga.—8'12"—6' 10' 6"—12"—10' 5/16" M.D.

ROLLS

Wickes, Pyramid Type, with mtr., Drop End Housing, sizes—18" x16": 12"x11": 8 ft. 1/2" Bertach 10 Ft. Wickes Vert. 1 1/2" cap. 6" Beloit, 3/16" cap. m.d.
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4, 5 & 7 Spindle Yoder

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McKay 60"-66"-48"-38"-96"

SEND FOR CATALOG 404

PLANERS

36"x48"x12" D. & H. Openside; 30"x30"x10" Gray; 20" Niles; 26x8 openside Cincinnati; 60x60x18 ft. Pond; 30"x30"x10 ft.; Am. 36x36x14 Ft.; Dietrich & Harvey with side bed

MILLERS

UNIV. No. 3 B. & S.; Kemps. Table 6'x34"; No. 3 & No. 4-A Brown & Sharpe; No. 2 Rockford S.P.D.; No. 2-B Kearney & Trecker Dble. Overarm, S.P.D.; No. 3 G-H Hendey VERTICAL—Model C & No. 6 Becker; No. 6 Van Norman Duplex
PLAIN No. 1-B, S.P.D. & No. 3-B E. & T. No. 3 & 4 Clin. high Pow.; No. 5 Le Blond, S.P.D.; No. 6 B&S; (3) Kearney & Trecker No. 3 Double Overarm, M.D.; No 4-B Brown

& Sharpe Double Overarm, Motor in base; Rapid Traverse; No. 4 Van Norman Duplex

LATHES

18"x10' Monarch Timken bear. Selective Geared Head; 20x12 Ft. Monarch Gap Lathe with gap out 30"
American Geared Head Lathe, 24"x12 Ft.; 24"x10 Ft.; 16" x8 Ft.; LeBlond Geared Head 24" x 14 Ft.
Bridgeford 26"x9 ft. and 34"x 16 ft. G.H. 15 speeds
28"x12 ft. Boye & Emmes
16"x6 ft. Hendey-Yoke Hd.
Am. Grd. Hd. 18x8; 24x16; 16x8 Bradford; 18x6 P&W; 30x18, L&S 18"x10' Grd. Hd. M.D. 30' Pit Lathe, 156" face plate

LATHES—TURRET

Warner & S.—No. 4, No. 2-A, No. 6; Potter & Johnson No. 6-A; No. 2-B Foster; No. 1-A W. & S. Univ.
Warner & Sweeney No. 2-A Close to 200,000 serial.
28"x24" Gisholt; 28" Pond

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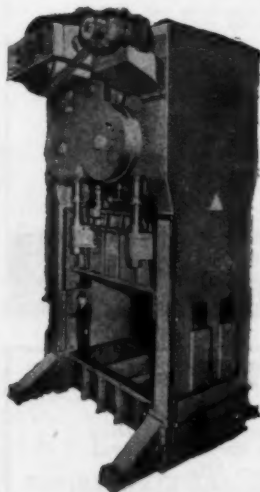
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Most Modern
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84" x 133" BED

PRESSES, Double Crank

Bliss No. 8 Tie Rod
Hamilton, No. 6010—1½
rod 10" shaft
(3) No. 6-D Bliss 12" str.;
36"x60" bed Air Cush.
(2) No. 153-C Bliss, 8" str.
34"x48" bed; 48" ht.
die space, Air Cushion;
(3) No. 154-G Bliss, 12"
stroke; 48" x 84" bed;
Air Cushion;

No. 94-G Toledo 2" stroke,
42"x84" bed; Air Cush.
No. 93-C Toledo 5" stroke,
34"x48" bed;
No. 8 Bliss, 36"x50" bed;
No. 152-B Cleveland, 36" bet.
Hamilton, No. 6010—1½
rod 10" shaft; Cleve. 6"
sh. 10" str.; Bed. 72"x50"

PRESSES, HORN

Bliss Nos. 39, 40, 21, 83
Toledo Nos. 14, 42, 41A, 43P

PRESSES, Hydraulic

100 & 200 ton Litchf.

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Nos. 1, 2, 3, 4, B. G. Bliss
No. 5, 6, No. 6 Bliss Cons.
No. 77 Toledo Open Back Gap
Frame
No. 75 Cons. B. G., all V belt
M. D. with motors
No. 4 V&O—7" stroke; M.D.
spring Cushion; No. 2 V&O;
No. 3 & 4 L & J.
Bliss Nos. 20, 21, 102 dbl. crk.

PRESSES, Straight Side

No. 804 Bliss—32" str. M.D.,
Tie Rod; No. 56 Bliss Cons.
No. 4019 Hamilton 800 ton
No. 78½, No. 77½ Bliss
Toledo—5" stroke
No. 305 Bliss—6" st. (3); No.
306 Bliss—4" stroke
Billings & Spencer, Trim. Press

PRESSES, Toggle

Bliss Nos. 5, 5A, 1½; Toledo
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Toledo, 97" betw. hous.
bed 60"x96" — stroke of
plunger 29"; 165½ 164;
No. 99 Steel

PRESS BRAKES

30' Birdabore Hydraulic Power
Press Brake or Forming Press;
Capacity approx. ½" plate. Self-
contained with controls, upper
and lower die holders.
Chicago Steel 10 Ft.x5/16" ca-
pacity; 13 Ft. long bed & ram;
Geo. A. Ohl 10 Ft.x5/16, M.
D. (2); Poorman 10 Ft.x10ga.

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G.&E., Invincible, 32", 28"x24"
Cin. 16"; 24" Am. & M.D. 28"
Rockford

RADIAL DRILLS

American 2½", 4", 6"; West. 6";
3" Fostick; 6" Carlton M.D.

SHEARS

Throatless, Marsh. No. 10P, No.
1 & ½"
POWER 13' ½" 10' ½" United
Cincinnati, Chicago Steel, Bertsch,
Niagara, 10 Ft. 3/16".
Niagara 10' ½" 18" gap.
12'14", 12'10"
10' 10" ga. Streine
Nia. 10' 10" ga. M.D.; 5' 10"
ga.; 3' 10" ga.;

NEWBOLD PLATE LEVELLER AND STRAIGHTENER

96" wide; 13 rolls and 2
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H.P. A.C. 3 phase 60 cycle
220 volt motor and control;
gears running in oil; Uni-
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10'x10'x26' N.B.P., 4 heads
 96"x42"x42' Southwark, 4 heads
 66"x48"x10' Cincinnati
 60"x60x18' Sellers, 3 heads
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 54"x42"x16' D&H Openside
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 48"x48"x16' N.B.P., Box Table, 2 heads
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LATHES

20' Gleason Pitt Lathe

110"x35' N.P.B. Engine Lathe, M.D.
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 48"x34' Bement Lathe, M.D.
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 36"x22' Lodge Shipley Pat. head
 36"x21' Niles, internal face plate drive
 26"x12' Putnam, semi Q.C.G., cone
 22"x10' Lodge Shipley, cone, Q.C.G.
 16"x8' Lodge Shipley, cone, Q.C.G.

SLOTTERS

10" Sellers, Motor Drive
 15" Sellers, Motor Drive
 20" Sellers, D.C. Motor
 20" Newton, Motor Drive
 22" Bement, Motor Drive
 22" Niles, D.C. Motor

BORING MILLS

48" Colburn, P.R.T., Q.C.G.
 10' Betts, 120" table
 10-16" Betts Extension Type, M.D.
 4" Bar Newark
 Nos. 1, 2 & 3 Barrett

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Singer Bldg., New York City

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14x10 Am. q.c. Lathe with taper
 17x8 Sidney q.c. Gear Lathe
 18x6 L&S, 12-spd. Gr. H. Lathe
 20x8' Hamilton Grd. Mfg. Lathe
 21x10 LeBlond Cone Dr. Lathe
 32x28 Bullard Triple Grd.
 Rockford Dbl. End Hydraulic, m.d.
 1½" Landis Dbl. Bolt Cutter, b.d.
 2" Landis Dbl. Bolt Cutter, b.d.
 3" Landis Sgle. Bolt Cut., leadscrew
 20-4 Spdle. Cin. Gang Drill
 C-13H Natco Hydraulic Mult. Drill
 No. 14 Natco 16x24 Multiple Drill
 No. 30 NATCO 24x40 Multiple Drill
 No. 40 Natco Straight Line Mult. Drill
 No. 121 Baker Mfg. Type Drill
 No. 14 Coburn Single Spdle. Drill

No. 4 Colburn Mfg. Type
 D-2 Colburn Hvy. Duty Drill
 D-1 Minster Hvy. Duty Drill
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 3' Carlton Sensitive Radial Drill
 Avey No. 3 Dbl. Spdle. Horiz. Drill
 No. 6 Jackson Die Sink. Machine
 48" Newton Dbl. Spdl. Cont. Miller
 No. 400 Curtis Oil Extractor
 No. 304A Oster Pipe Machine
 Ingersoll Tub Grinder
 Sellers Drill Grinder
 Union Hob Grinder
 16" Heald Surface Grinder
 No. 0 Baker Keyseater
 24x24x6 Gray Planer
 48x72x16 Cincinnati 4 hd Planer

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16" x 6' Lodge & Shipley Grd. Hd. M.D. 12 speed.
 16" x 8' American Grd. Hd. 12 speed, Motor in base.
 18" x 8' Monarch Grd. Hd. Motor in Base.
 18" x 8' Lodge & Shipley Grd. Hd. M.D. 12 speed.
 20" x 8' American Grd. Hd. 8 speed.
 30" x 10' American Grd. Hd. 12 speed, M.D.
 30" x 16' American Grd. Hd. 12 speed, M.D.
 30" x 24' American Grd. Hd. 12 speed, M.D. 2 carriages
 48" x 48" x 16' Pond Planer, H.D. 4 heads, Arr. M.D.

LATHES

14"x6' & 16"x6' LeBlond 3 S.C.D. D.B.G.
 19"x8' Le Blond, Q.C., 3 S.C.D.
 21"x10' LeBlond, 3 S.C.D. D. B. G.
 25"x16' LeBlond, 3 S.C.D., D.B.G.
 20"x8' American, 3 S.C.D. D.B.G.
 20"x16' American, 3 S.C.D. D.B.G.
 18"x24' Lodge & Shipley Engine Lathe.
 30"x16' Lodge & Shipley Cone Q.C.
 20"x10' Hendey Cone Q.C.

PLANERS AND SHAPERS

24" Kelly Shaper, Cone drive.
 24"x24"x6' Gray Planer.
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 18, 20, 24" G & E Shapers, cone drive.
 18, 20, 24 and 28" Gould & E. Shapers, S.P.D.

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3 1/2', 4', 5', 6' Amer. Triple Geared S.P.D.
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 21", 24" Cinc. B. Upright Geared Feeds.
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 No. 18HM Gould & Eberhardt S.P.D.
 No. 11 B & S spur and bevel Gear Cutter.
 50" Rhenania Gear Hobbing machine, C.D.
 No. 1 Cross Gear Tooth Rounder.

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 No. 4 Cinc. H.P. Cone Univ. 3 S.C.D., D.B.G.

No. 2 Kempsmith Univ. Vert. Hd.
 No. 2 Kempsmith Cone, M.D.
 No. 3 Kempsmith Universal Cone.
 No. 2 Hendey Universal S.P.D.
 No. 3 LeBlond Plain 3 S.C.D.

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New Schuchart & Schutte Hob Grinder (Barg)
 No. 16 Brown & Sharpe Plain.
 Diamond Face Grinder.
 No. 1 Diamond Surface Grinder.
 No. 50, 550, 60, 65, 70 Head Internal.
 No. 75 Head Internal.
 6"x18" Landis Plain, Self Contained.
 10"x36" Landis Plain, S.C.
 53" Besley Ball Bearing Vert. Spindle Disc.

BORING MILLS

48" Bullard Cone.
 60" Gisholt, P.R.T.

TURRET LATHES

No. 4 & 6 W & S Plain Cone Drive.

MISCELLANEOUS

2 1/2" Landis Bolt Cutter.
 No. 4 & 5 Mitts & Merrill Keyseaters.
 Model W Cleveland Pch. & Shr. 60" thrt., M.D.
 8"x4 1/2" Chicago Bending Brake.
 6"x3/16" Chicago Bending Brake.
 No. 92D Toledo D.C. Press.
 No. 4A High Speed Riveter New.
 2—No. 35 Niagara Presses New.
 No. 35 Niagara Press New.
 10"x3/16" Sholl Power Squaring Shear M.D.
 6"x6" Peerless Shaping Saw.
 35 K. W. Federal Spot Welder.

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217 EAST SECOND STREET

CINCINNATI, OHIO

2500 MACHINES IN OUR WAREHOUSES

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Barrett No. 2 cyl., 5" bar.
Colburn 34" Vert., M.D.
Bullard 42"—Two Head.

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P. & W. Nos. 11, 12, 13 Mult.
Morris 4" and 5" Radials.
Prentice 0" Radial.
Allen 3, 4, & 6 sp. B.B.
Henry & Wright 4 sp. and 6 sp.
Upright Drills—many makes and sizes.

GRINDERS

B. & S. Nos. 1, 2, 3, Univ.
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2 Sp. Hole, No. 40 Chuck.
Disc Grind.—All makes & sizes.
Nort., 6x32", 10x36, 10x50.

LATHES

Hendey Lathes—most sizes.
Pittsburgh 32"x24", q.c.g.

MILLERS

Lincoln Millers of all kinds.
Milwaukee Cam Miller.

PRESSES

Bliss No. 18, 19 & 20 O.B.I.
V. & O. No. 12, 14 D.A.C. In.
Stoll No. 67, a.a.
Bliss Nos. 204 & 304 Straight Sided
Ferracute No. 105 D.A.
Terkelsen D-1 150 t. M. Spring.
Stand. No. 4-R S.S. Reducing.
W-F Long. Stroke for sheila.
Ferracute No. PG-P4.
Bliss No. 16, 4" str., Overh.
W-F Type for cartridges (20).
W-F Six Plunger for cartridge clips.
W-F 3000 Ton Hyd. Hobbing
Bliss No. 27K—1000 Ton
Knuckle Joint
Bliss No. 77½ S. S. Geared

SCREW MACHINES

Grid. 9/16", 7/8", 1 1/4" Mod. C.
Clev. 3/4", 1 1/2", 1 3/4", 2", 2 1/4", Auto.
B.&S. Auto.—most sizes (we are specialists).
New Brit. 1x5".
Hand Screw M. of all makes & sizes: W. & S. Foster, B.&S. Potter & Johnston Nos. 5A, 6A Chuckers.
J. & L. S x 36 Steel Head.

MISCELLANEOUS

Broches, LaPointe 1-2-3-4.
Burnishing Barrels, Abbott.
Gear generator—Lees-Bradner No. 5A
Gear generators—Gleason 6" 11"
Hammers—Board Drop.
Hammer—Standard 800 lb. automatic.
Hammers—Chambersburg 1500 lb. Steam Drop (6)
Headers, many sizes & makes.
Measuring Machines, P.&W. 12", 24" & 48".
Planer—Detrick & Harvey 36" x 36" x 12' Openside.
Planer—Cincinnati 56"x42"x16", four head, m.d.
Rolling Mill, Robertson 12"x12" for non-ferrous metal.
Shapers—from 7" to 32".
Shear—Stoll 10'-1/4"
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Spring Colter—Sleeper & Hartley No. 1 1/2 Univ.
Swagers—12 in stock.
Tapper—Threadnut No. 2 auto. nut.
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Wire Formers, Nilson & Baird.

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37-127 WATER ST..

1-1

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ACTUALLY IN STOCK

LATHES

American motor in base,
14"x6"
Chard Production, 16"x6"
Niles, 36"x14"
Brown & Sharpe Turret
No. 6
Lodge & Shipley, M.D.,
20"x8"
South Bend, 24"x10' M.D.,
taper
South Bend, 16"x6"
No. 1 Warner & Swasey
Reed, 16"x8"
Sidney Production, 12"x5"
Foster No. 2
20" Acme Turret
21" Gisholt
24" Gisholt
No. 2 Bardons & Oliver

No. 4½ Bardons & Oliver
2x24 J and L

MILLING MACHINES

No. 2 Pratt & Whitney
Garvin Hand Mill
No. 5 Hendey Production
No. 35 Ohio Universal,
dividing head, vertical
head
Ingersoll Slab Mill
2 New Index Vertical
Mills
No. 1 Kempsmith
No. 3 Kempsmith

DRILLS

14" Allen, M.D. 6 spindle
Superior, 24" sliding head
20" Barnes

SHAPER

Gould & Eberhardt 20"
16" American, M.D., late
type
20" Stockbridge
20" Davis

MISCELLANEOUS

Doty Bar Shear (new)
8' Stoll Shear
18-H Gould & Eberhardt
Garvin Cam Cutter
No. 63 Consolidated
Press
Garvin Tapping Machine
Cleveland Model B 7/8

AUTOMATICS

7/8 Model G. Gridley (2)
New Britain 1-7/8x7
New Britain 1x5

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BORING MILLS,
Horizontal

4-3" bar Niles Knee Type.

BORING MILLS,
Vertical84" Niles, 2 bds., Motor Dr.
31" N.B.P., 2 bds., M.D.**DRILLS,**
Radial4" Drees Plain
4" Drees Univ. M.D. 13" col.
6" Western Heavy M.D.
12 spindle Bausch No. 4 M.T.
3" American, Sensitive.
5" - 6" Amer. Tri. Grd.
6-7" Amer. Tri. Grd.
4 spindle Henry Wright
3" Prentice, Gear Box M.D.
24 spindle Bausch No. 2 M.T.**GRINDERS**3"x18" Norton, Self Cont. (7)
6"x32" Norton, Countershaft
6"x54" Fitchburg Pl., m.d.
15"x15"x96" Norton Open-
side Surface, M.D.
16"x50" Norton Self Cont.
16"x68" Landis Crankshaft
No. 6 Bryant Chucking
No. 3 Landis Universal
No. 2 Sellers Univ. Tool
18" Bessy No. 26 Disc.
18" Badger No. 220 Disc.
20"x96" Landis Univ.
No. 11 Landis Tool & Cutter.
No. 55, 60 and 65 Heald Cyl.**LATHES**14"x6" Monarch, Q.C.G., Cone
14"x6" L. & S., T.A., M.D.
16"x10" Monarch L.C.G. Cone.
18"x10" South Bend, M.D.
18"x8" L. & S., Q.C.G.,
Cone, T.A.
18"x8" Lodge & S. Cone.
20"x12" Hendey, Q.C.G., Cone
20"x42" x10" Fay Scott, Gap,
M.D.
20"x12" New Haven, T.A.
21"x8" LeBlond, Q. C. G.
21"x8" Conradson, Grd. Hd.
22"/24"x12" L. & S., Q.C.G.,
M.D.
24"x12" Putnam Grd. Hd.,
M.D.
24"x14" L. & S. T.A., Cone
26"x10" Pond, Q.C.G., Cone.
26"x11" Wickes Heavy Cne
30"x12" L. & S., Cone, Q.C.G.
30"x16" N.B.P. Axel & Jour-
nal, Center Drive, M.D.
32"x14" N.B.P., Q.C.G., T.A.
32"x17" Fiffeld, triple grd.
36"x14" Pond, Grd. Hd., M.D.
36"x14" Hahn Larmon, Q.C.
G., Cone**LATHES**
(Continued)36"x16" Putnam, raised 47".
36"x24" Bridgeford, M.D.
42"x34" S. & B., Grd. Hd.,
M.D.
42"x30" Johnson Grd. Hd. M.D.
42" N.B.P. Center Dr. Whl.
48"/60"x14" Putnam, Heavy
48"x16" Fiffeld Cone
48"x36" Fiffeld, m.d.
60"x34" Putnam, raised to
72"
90" N.B.P. Heavy, Wheel
Peerless Banding Lathe, M.D.**MILLERS**No. 14 Amer. Univ.
No. 14 Becker Univ.
No. 4B Becker Vert.
No. 5 B. & S. Vert.
No. 5 Becker Vert. Rotary
No. 6 Becker, Vert. Rotary
No. 24 B. & S., 72" table
No. 4 Cinci., Plain
No. 7H Becker Lincoln Type (2)
28" Cincinnati Semi Auto.
No. 26 Becker Pl., Cone
42"x42"x8" Bement Pond,
Add. Rail Miller, 4 bds., h.d.
No. 6 Jackson Die Sinkers (3)
No. 1 Standard Hand.
No. 13B B. & S. Mgr.
No. 33 Kempemith Mfg.
Taft Pierce Thread Miller
U. S. Hand Miller, M.D.**PLANERS**48"x48"x12" D&H Openside.
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Rev. M. D. with 25 hp. DC
Motor
42"x42"x16" N.B.P., M.D.
36" Newton Rotary, M.D.
36"x36"x12" Ryerson Opens.
36"x36"x12" Chandler, 3 bds.
30"x30"x10" D. & H. Openside.
27"x27"x6" W. & P., 1 Hd.
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24"x24"x7" Niles
16"x16"x48" Walter Bros.**TURRET LATHES**1"x15" P. & W., bar
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No. 3 Bardons & Ol. 1 1/2" cap.
No. 4 Warner Swasey — not
back geared
No. 9 Bardons & Oliver, 3"
H.S.
No. 8 Warner & Swasey, 3-1/2"
bar Capty.
28" Gisholt M.D.
31"x36" Cinci. Acme Geared
Head, Bar, (2)
31"x36" Cinci. Acme Geared
Head, Chucking
3"x36" Pratt & Whit., bar eq
2 1/2"x24" & 3"x36" J. & L.
Geared Cinci. Acme, Cone, Bk.,
Geared**MISCELLANEOUS**Automatic, 2 1/2" Gridley, 1 Sp.
Automatics, 2-3" - 3-1/2"
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1 1/2" - 1 1/2" Gridley 4 spin. Mod-
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Bolt Threader, 2" Natl.
Bolt Threader, 3" Wma., Dble.
Head, Motor Drive
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Chucking, Nos. 34 & 23 N. B.
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Gear Generator, No. 1 Lees-
Bradner
Gear Hobber, 6" Planter.
Gear Hobbers, No. 12 Barber
Coleman, P.R.T. (2)
Gear Planer, 24" Gleason.
Hammer, 600 lb. N.B.P. Stm.
Hammer, No. 2B Nazel, M.D.
Hammer, No. 3B Nazel, M.D.
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Punch, 1"x3/8" shears, 8" pl.
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angles, 1" hole thru 1"
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36" throat, Armor Plate, 6x
3" angles, wt. 28,000 lbs.
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Rolls, 8x10" H & J No. 2
Rolls, 12" Corrugating—Heavy
Saw, Cold, 36" Expen Lucas,
(2)
Saw, No. 3 Ryerson Frict. D.C.
Saw, 6" Avery Millband.
Saw, 6" Gordon No. 2B Inter.
Saw, 10" Napier Band
Shapers, 20" & 24" Cinci.
Shaper, 24" Oreen City, M.D.
Shaper, 28" Ohio Dread-
naught, M.D.
Shaper, 16" Stockbridge Cone
Shear, 30" Cleveland, No. X.
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 wet surf. Gr. Ch.
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 Cyl. M.D.
 No. 12 B. & S. 9x36

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Clevelands, 12—3¼"
 Mod. A, Ser. No. 34000
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 No. 31000
 1—½"-¾", Mod. A, Ser.
 No. 32000
 7—1¼", Mod. B, Ser. No.
 34000
 2—2" Mod. B, Ser. No.
 34000
 1—3", Mod. A, Ser. No.
 33000, M.D.
 4—3" 4 spdl. Mod. M,
 Ser. No. 33000, M.D.
Brown & Sharps, No. 00G
 Full Auto., Ser. No. 6800,
 S.P.
 No. 00 Full Auto., Ser.
 No. 5988
 No. 0 B. & S. Plain
Cone, 2—¾", Four Spdl.
 Ser. No. G224G, M.D.
Gridleys, 1—1¾" 4 sp.
 Mod. F, Ser. No. 7500, BD.
 2—¾" 4 sp., Mod. G,
 Ser. No. 8600, M.D.
 1—1¼" 4 sp., Mod. G,
 Ser. No. 10000, M.D.
 4—¾" 4 sp., Mod. F, Ser.
 No. 4400, M.D.
 2—2¼" 4 sp., Mod. F,
 Ser. No. 8000
 1—4¼" Single Spdl., M.D.
National Acme, 2, Mod.
 No. 53, Ser. No. 10300, Pl.

LATHES

So. Bend 13"x5" P.C. Eng.
 So. Bend 13"x6" Gap Pla. Ch.
 Bd.
 Walcott—14x5 .C.
 Greaves-Klusman 16x5 Q.C.
 Schumacher & Boye 18"x10"
 Q.C. tap. att. B.D.
 Hendey 18"x12" .C. S.B.G.
 chuck, B.D.
 Monarch 18"x6" Geared head,
 tap. att. M.D.
 Flather 19"x10" Q.C. 2 chks.

MILLERS

No. 2 Cinn. Univ. Div. Head
 No. 2 Chgo. hand mill

PRESSES

Robinson No. 15
 Willard No. 2 O.B.I.
 25 ton Henry & Wright Roll fd.
 No. 3 R. & K. O.B.I. 2½ str.
 No. 4½ Niagara O.B.I. 27 ton
 Willard O.B.I. No. 2
 No. 55½ Toledo

SHAPERS

20" Steptoe, B. G., vise, C/S

MISCELLANEOUS

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 75 lb. cap.
 Pratt & Whitney 2 spdl. prof.
 Waterbury-Parrell Thread
 Roller No. 40

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Monarch Lathe: 18"x8" Q.C.G. taper attach.

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Radial Drill: Western 6 ft. arm, S.P.D.
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No. 4 Cincinnati, No. 2 B. & S.
Landis Cylindrical Grinders: 18x50"
Keyseaters: No. 1 & No. 2 Davis, B.D.
Die Filers: Oliver & Grob, M.D.
Rolls: Bertsch I.T. drop end, 8' 1/4" cap.
G.M.D. 52" 1/4" cap. pyramid, D.E. B.D.
Brakes: Chicago Steel Apron Brake, 8' 3/4"
cap. G.M.D., 9 ft. 10 ga. B.D.
Turret Lathes: Warner & Swasey No. 6,
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54"x16' Johnson, m.d., triple grd.
18"x10' Greaves Klusman, belt dr.
13"x6' Davis (2) tap. att. motorized
16"x6' Hendey, b. d. (no tie bar)

MISCELLANEOUS

42" Bullard Vertical Boring Mill, Q.C. feeds, 2 heads
16" Ohio Shaper, swivel table, tilting top, belt drive
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25-ton Henry & Wright dieing machine
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NEW 3 Phase B. B. Motors 1/2 to 25 H. P., 5 H. P. \$55.75

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Planer, 36"x36"x12' Niles, single head.
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1, 2 & 3 Sp. Allen, P. F. & T. A.

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No. 78 W. & M. Auto. Surf. B. D.

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MISCELLANEOUS

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Gear Cut., No. 3-26"-B. & S.

Gear Holber, No. 12 Barber C.

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Saw, 6x6 Racine, Hack.

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 Edlund, No. 1A, 4 spdl. P.f. No. 3 M.t.
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MISCELLANEOUS

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 No. 1½ Valley, Univemal.

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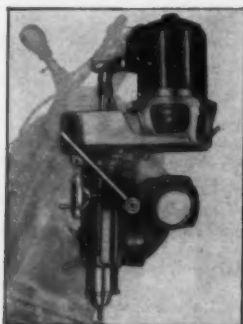
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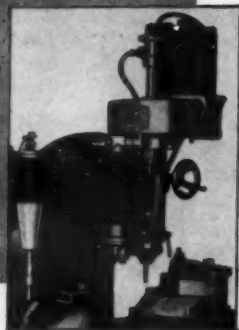
EKLIND UNIVERSAL MILLING HEAD AND TURCHAN HYDRAULIC DUPLICATING UNIT

Model A HC Eklind Turchan Duplicating Attachment is designed and priced for die shops making Bakelite, Plastics, Rubber and Drop Forge molds and dies. Will handle average work efficiently, economically and speedily. Oil pressure controlled by tracer, feeds spindle and tracing arm to follow model accurately. Die capacity is 16" long by width, depending on cross feed of machine. Capacity can be increased by mounting head on side of overarm.

Model A H Eklind Universal high speed Milling, Drilling and Boring unit is a most valuable tool room aid. Can be had separately and the duplicating attachment added later.

Send for our bulletins giving full details and prices.

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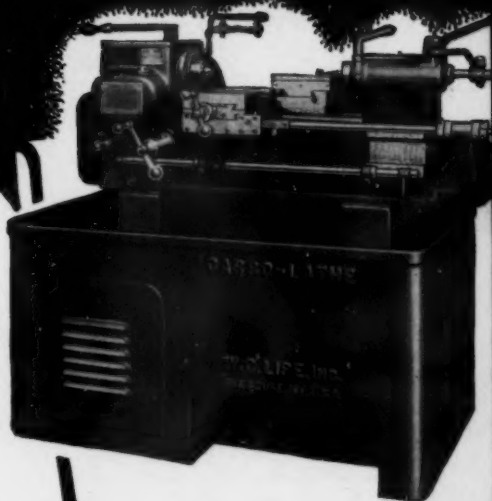


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